#946

U. S. Forest Service Research Paper INT-19 1965

A Bibliography of Engelmann Spruce

Earl M. Christensen and Melvin J. Hunt

21; 30; 49; 84

INTERMOUNTAIN FOREST AND RANGE EXPERIMENT STATION
Forest Service
U. S. Department of Agriculture
Ogden, Utah

This publication was prepared and is issued under terms of a cooperative agreement between Brigham Young University and the Forest Service, United States Department of Agriculture, dated June 13, 1964.

U.S. Forest Service
Research Paper INT-19
1965

A BIBLIOGRAPHY OF ENGELMANN SPRUCE

by

Earl M. Christensen
Chairman, Department of Botany
Brigham Young University

and

Melvin J. Hunt

INTERMOUNTAIN FOREST AND RANGE EXPERIMENT STATION
Forest Service
U.S. Department of Agriculture
Ogden, Utah
Joseph F. Pechanec, Director

THE AUTHORS

DR. EARL M. CHRISTENSEN is Professor and Chairman of the Department of Botany at the Brigham Young University, where he has taught since 1949. He has published two bibliographies of Utah aquatic biology and several articles on plant ecology and range management.

MELVIN L. HUNT is a graduate student at the Brigham Young University studying for a master's degree in botany and range management.

A BIBLIOGRAPHY of ENGELMANN SPRUCE

This bibliography of Engelmann spruce (Picea engelmannii Parry), while generally comprehensive, emphasizes publications on the ecology of the species. It supplements the excellent bibliography by Ronco (1961) on Engelmann spruce and subalpine fir, which emphasized publications about management of these species. The present publication includes references to items published through calendar year 1963 and provides brief annotations describing the nature of information about Engelmann spruce contained in the referenced item. Publications whose titles are descriptive or self-explanatory are not annotated. This bibliography includes references to printed publications and to theses, but it does not refer to typewritten reports.

ANONYMOUS. 1935. Engelmann spruce: Picea engelmannii Engelmann. Amer. Forests 41: 598-599. (Trees and their uses No. 9 - Engelmann spruce, p. 597.)

Description of species, distribution, and economic value.

ANONYMOUS. 1944-45. Beetle plague. Timberman 46(5): 36-37, 78.

Colorado and Wyoming Engelmann spruce infestations of Dendroctonus engelmanni.

ABRAMS, LEROY. 1940. Illustrated flora of the Pacific States Washington, Oregon, and California. Vol. I. 536 pp., illus. Stanford Univ., Calif.: Stanford Univ. Press.

Description and generalized distribution.

AGERTER, SHARLENE R. (See Glock, Studhalter, and Agerter. 1960)

ALEXANDER, ROBERT R. 1956. A comparison of growth and mortality following cutting in old-growth mountain spruce-fir stands. U.S. Forest Serv., Rocky Mountain Forest and Range Expt. Sta. Res. Note 20, 4 pp.

Describes three methods of harvest, but does not give growth and mortality data for individual species.

ALEXANDER, ROBERT R. 1957. Preliminary guide to stand improvement in cutover stands of spruce-fir. U.S. Forest Serv., Rocky Mountain Forest and Range Expt. Sta. Res. Note 26, 6 pp.

A guide for improving stands containing Engelmann spruce, subalpine fir, and lodgepole pine.

ALEXANDER, ROBERT R. 1957. Damage to advanced reproduction in clearcutting spruce-fir. U.S. Forest Serv., Rocky Mountain Forest and Range Expt. Sta. Res. Note 27, 3 pp.

ALEXANDER, ROBERT R. 1958. Silvical characteristics of Engelmann spruce. U.S. Forest Serv., Rocky Mountain Forest and Range Expt. Sta. Paper 31, 20 pp.

A review of literature of the silvics of Engelmann spruce; based on 40 published sources.

ALEXANDER, ROBERT R. 1963. Harvest cutting old-growth mountain spruce-fir in Colorado. Jour. Forestry 61: 115-119.

ALEXANDER, ROBERT R., and JESSE H. BUELL. 1955. Determining the direction of destructive winds in a Rocky Mountain timber stand. Jour. Forestry 53: 19-23.

Describes damage in Engelmann spruce and lodgepole pine forests.

ALLEN, GEORGE S. 1957. Storage behavior of conifer seeds in sealed containers held at 0° F., 32° F., and room temperature. Jour. Forestry 55: 278-281.

Germination after storage from 5 to 7 years.

ALLEN, GEORGE S., and WILLEM BIENTJES. 1954. Studies on coniferous tree seed at the University of British Columbia. Forestry Chron. 30: 183-196.

ALLER, ALVIN R. 1960. The composition of the Lake McDonald Forest, Glacier National Park. Ecology 41: 29-33.

Includes quantitative phytosociology data and climatic data.

ALLISON, F. E., and C. J. KLEIN. 1961. Comparative rates of decomposition in soil of wood and bark particles of several softwood species. Soil Sci. Soc. Amer. Proc. 25: 193-196.

ALLISON, GEORGE W. 1955. An application of an aerial photo volume table to forest inventory work in British Columbia. Forestry Chron. 31: 366-368.

AMMAN, GENE D., and PAUL H. BALDWIN. 1960. A comparison for censusing woodpeckers in spruce-fir forests of Colorado. Ecology 41: 699-706.

Discusses distribution of insects and control of insects by woodpeckers.

ANDERSON, I. V. 1954. Suitability of Rocky Mountain woods for veneer and plywood. Jour. Forestry 52: 587-591.

Engelmann spruce is one of five major species discussed.

ANDERSON, I. V. 1956. Engelmann spruce, its properties, uses, and production. U.S. Forest Serv., Intermountain Forest and Range Expt. Sta. Res. Paper 39, 16 pp.

Compares quality of Engelmann spruce lumber with that of other lumber species. Discusses estimated yield and production.

ANDERSON, I. V. 1956. Properties, uses and production of Engelmann spruce. Forest Prod. Jour. 6: 307-311.

ANNAND, P. N. 1928. A contribution toward a monograph of the Adelginae (Phylloxeridae) of North America. Stanford Univ. Pub. Biol. Sci. 6: 1-146.

Plant lice on Engelmann spruce: Pineus boycei n. sp. in Montana; Pineus engelmanni n. sp. in Oregon.

ARLIDGE, J. W. C. 1958. A preliminary classification and evaluation of Engelmann spruce-alpine fir forest at Bolean Lake, B. C. Forestry Chron. 34: 324-325.

ARTHUR, JOSEPH CHARLES, and FRANK DUNN KERN. 1906. North American species of Peridermium. Torrey Bot. Club Bul. 33: 403-438.

Several species of Peridermium on Engelmann spruce.

ASHTON, RUTH E. 1929. Preliminary observations on revegetation of the Twinsisters burn in Rocky Mountain National Park. Jour. Colo.-Wyo. Acad. Sci. 1(2): 13. (Abstract.)

Notes the invasion of a lodgepole pine forest by Engelmann spruce.

AYRES, H. B. 1899. Washington Forest Reserve (western part). U.S. Geol. Surv. Ann. Rpt. 19, 1897-98, Part V-Forest reserves: 283-313.

Engelmann spruce is small and not abundant; found at high altitudes.

AYRES, H. B. 1900. The Flathead Forest Reserve. U.S. Geol. Surv. Ann. Rpt. 20, 1898-99, Part V-Forest reserves: 245-316.

AYRES, H. B. 1900. Lewis and Clark Forest Reserve, Montana. U.S. Geol. Surv. Ann. Rpt. 21, Part V-Forest reserves: 27-80.

Community; Engelmann spruce is abundant.

BAILEY, L. H. (Ed.) 1925. The cultivated evergreens. New edition. 434 pp. New York: Macmillan.

Distribution of Engelmann spruce in cultivation.

BAILEY, L. H. 1933. The cultivated conifers of North America. 404 pp. New York: Macmillan.

BAKER, FRANCIS E. (See Fleming, Baker, and Koblitzky. 1937)

BAKER, FREDERICK S. (See Korstian and Baker. 1925)

BAKER, FREDERICK S. 1949. A revised tolerance table. Jour. Forestry 47: 179-181.

Lists Engelmann spruce as a "tolerant" species on a five-part scale from "very tolerant" to "very intolerant."

BAKER, FREDERICK S., C. F. KORSTIAN, and N. J. FETHEROLF. 1921. Snowshoe rabbits and conifers in the Wasatch Mountains of Utah. Ecology 2: 304-310.

Engelmann spruce is subject to damage during winter by rabbits.

BALDWIN, PAUL H. 1960. Overwintering of woodpeckers in bark beetle-infested spruce-fir forests of Colorado. IN: Proc. XII Internatl. Ornith. Cong., Helsinki, 1958, pp. 71-84.

Engelmann spruce beetles and birds.

BALDWIN, PAUL H. (See Amman and Baldwin. 1960)

BARGER, ROLAND L. (See Mueller and Barger. 1963)

BARNES, G. H. 1937. The development of uneven-aged stands of Engelmann spruce and probable development of residual stands after logging. Forestry Chron. 13: 417-457.

BARR, PERCY MUNSON. 1930. The effect of soil moisture on the establishment of spruce reproduction in British Columbia. Yale Univ. School of Forestry Bul. 26, 77 pp.

BARROWS, J. S. 1951. Forest fires in the northern Rocky Mountains. U.S. Forest Serv., North. Rocky Mountain Forest and Range Expt. Sta. Paper 28, 251 pp.

BARROWS, J. S. 1951. Fire behavior in northern Rocky Mountain forests. U.S. Forest Serv., North. Rocky Mountain Forest and Range Expt. Sta. Paper 29, 103 pp.

Table A-5 analyzes rate of spread of fires in subalpine fir and Engelmann spruce forests.

BARTON, G. M., and J. A. F. GARDNER. 1957. A comparison of the heartwood extractives of Picea glauca and Picea engelmanni. Forestry Chron. 33: 136-138.

BATES, CARLOS G. 1911. Forests and stream-flow. Soc. Amer. Foresters Proc. 6(1): 53-63.

Distribution of Engelmann spruce.

BATES, CARLOS G. 1912. Silvicultural systems of management for central Rocky Mountain Forests. Soc. Amer. Foresters Proc. 7: 106-116.

Discusses management of forests containing Engelmann spruce.

BATES, CARLOS G. 1917. Forest succession in the central Rocky Mountains. Jour. Forestry 15: 587-592.

Discusses place of Engelmann spruce in succession in Rocky Mountain forests.

BATES, CARLOS G. 1917. The role of light in natural and artificial reforestation. Jour. Forestry 15: 233-239.

Compares minimum requirements of light for sustained growth of yellow pine, lodgepole pine, Douglas-fir, and Engelmann spruce.

BATES, CARLOS G. 1923. Physiological requirements of Rocky Mountain trees. Jour. Agr. Res. 24: 97-164.

Physiology of Engelmann spruce and associated species.

BATES, CARLOS G. 1923. The transect of a mountain valley. Ecology 4: 54-62.

Discusses succession in Colorado and analyzes topographic distribution of Engelmann spruce; includes data on evaporation, soil temperature, and soil moisture.

BATES, CARLOS G. 1924. Forest types in the central Rocky Mountains as affected by climate and soil. U.S. Dept. Agr. Dept. Bul. 1233, 152 pp.

Discusses community, succession, and distribution.

BATES, CARLOS G. 1925. A key to the identification of some coniferous seedlings. Jour. Forestry 23: 278-281.

Seedling morphology.

BATES, CARLOS G. 1925. The relative light requirements of some coniferous seedlings. Jour. Forestry 23: 869-879.

Discusses requirements of eight coniferous species including Engelmann spruce; gives seed weights of several species.

BATES, CARLOS G. 1926. What shall we do with Engelmann spruce? Colorado Forester 1926: 21-25.

BATES, CARLOS G., N. B. NOTESTEIN, and PETER KEPLINGER. 1914. Climatic characteristics of forest types in the central Rocky Mountains. Soc. Amer. Foresters Proc. 9: 78-94.

Colorado.

BATES, CARLOS G., and JACOB ROESER, JR. 1924. Relative resistance of tree seedlings to excessive heat. U.S. Dept. Agr. Dept. Bul. 1263, 16 pp.

Compares Engelmann spruce seedlings with those of other conifers for heat resistance without the drought factor.

BATES, CARLOS G., and JACOB ROESER, JR. 1928. Light intensities required for growth of coniferous seedlings. Amer. Jour. Bot. 15: 185-194.

Physiology of Engelmann spruce.

BATHEN, R., and F. FROST. 1951. Forsök med skjermplanting i fjellet. Tidsskr. Skogbr. 59: 390-394.

Snowbreak planting in Norway.

BATRA, L. R. 1959. A comparative morphological and physiological study of the species of Dipodascus. Mycologia 51: 329-355.

Dipodascus aggregatus in frass of ambrosia beetle in Engelmann spruce.

BEETLE, A. A. 1961. Range survey in Teton County, Wyoming. Part I. Ecology of range resources. Wyo. Agr. Expt. Sta. Bul. 376, 42 pp.

Community description.

BEHLE, WILLIAM H. 1955. The birds of the Deep Creek Mountains of central western Utah. Univ. Utah Biol. Ser. 11(4): 1-34.

Describes the community and the distribution of Engelmann spruce.

BEHLE, WILLIAM H., JOHN B. BUSHMAN, and CLIFTON M. GREENHALGH. 1958. Birds of the Kanab area and adjacent high plateaus of southern Utah. Univ. Utah Biol. Ser. 11(7): 1-92.

Community description; distribution of Engelmann spruce.

BEIDLEMAN, RICHARD G. 1957. Fire burn succession studies in the northern Colorado Rockies. Jour. Colo.-Wyo. Acad. Sci. 4(9): 39.

Succession following fire.

BESSEY, CHARLES E. 1896. The conifers of Pike's Peak region. Amer. Naturalist 30: 748-749.

Community description.

BETHEL, ELLSWORTH. 1925. The conifers and "evergreens" of Colorado. Colo. Mag. 2(1): 1-23.

Community description.

BETHEL, ELLSWORTH. (See Rhoads et al. 1918)

BETTS, HAROLD S. 1941. American woods. Engelmann spruce, Picea engelmanni. U.S. Dept. Agr., Forest Serv. 10 pp.

BETTS, HAROLD S. 1945. Engelmann spruce. U.S. Dept. Agr., Forest Serv., Amer. Woods Ser., 8 pp.

BETTS, N. DeW., and A. L. HEIM. 1914. Tests of Rocky Mountain woods for telephone poles. U.S. Dept. Agr., Agr. Bul. 67, 28 pp.

Value of pole timber of fire-killed trees; distribution.

BIENTJES, WILLEM. (See Allen and Bientjes. 1954)

BILLINGS, W. D. 1957. Replacement of spruce-fir forest by alpine tundra as a result of fire. Ecol. Soc. Amer. Bul. 38: 70. (Abstract.)

Succession.

BJARNASON, HAKON. 1954. La reboisement de l'Islande. (Reforestation of Iceland.) Schweiz. Zeitschr. Forstw. 105(8): 450-459.

BJARNASON, H., and H. RAGNARSSON. 1958. Viðurvöxtur barrtrjaa a Islandi. Arsr. Skógrœktarf. Íslands 1958: 110-114.

Growth of conifers in Iceland.

BJARNASON, H., and E. G. SAEMUNDSEN. 1949. Fræsöfnun, sáning og groðursetning. Arsr. Skógrœktarf. Islands 1949: 53-79.

Seed collection, sowing, and planting in Iceland.

BLACKFORD, J. L. 1944. Wards of the spruce: Birds that haunt the wild, dark domain of the spire-like Engelmanns. Amer. Forests 50: 156-157.

Community description.

BLACKMAN, M. W. 1940. A new species of Xylechinus Chapius from Montana (Coleoptera, Scolytidae). Ent. Soc. Wash. Proc. 42(6): 123-125.

A new bark beetle on Engelmann spruce.

BLAKE, I. H. 1923. An ecological reconnaissance in the Medicine Bow mountains. Ecol. Monog. 15: 207-247.

Community description.

BLOOMBERG, W. J. 1950. Fire and spruce. Forestry Chron. 26: 157-161.

Succession.

BLUMER, J. C. 1906. Rocky Mountain seedling growth. Forestry Quart. 4: 98-105.

Natural pruning; Pike's Peak Forest Reserve.

BOE, K. N. 1954. Periodicity of cone crops for five Montana conifers. Mont. Acad. Sci. Proc. 14: 5-9.

Compares seed production west and east of the Continental Divide in Montana.

BOURCHIER, R. J. 1953. Forest disease survey: yellow witches' broom of spruce. Forest Insect Dis. Surv. Canada Rpt. 1952: 123.

BOWERS, NATHAN A. 1956. Cone-bearing trees of the Pacific Coast. 169 pp. Palo Alto, Calif.: Pacific Books.

BOWMAN, ISAIAH. 1911. Forest physiography. 759 pp. New York: John Wiley and Sons, Inc.

A general review of early United States forest literature stressing distribution.

BOYCE, J. S. 1943. Host relationships and distribution of conifer rusts in the United States and Canada. Conn. Acad. Arts and Sci. Trans. 35: 329-482.

Comprehensive list of pathogenic rust fungi; host indexes.

BOYD, RAYMOND J., JR. 1952. Effect of harvesting methods on reproduction in the mountain Engelmann spruce-alpine fir type. U.S. Forest Serv., Rocky Mountain Forest and Range Expt. Sta. Res. Note 11, 2 pp.

Describes three different harvesting methods and compares their effects.

BRADLEY, G. A. 1957. Aphids of the genus Cinara Curtis in Canada. Canada Dept. Agr., Div. Biol. Bimo. Prog. Rpt. 13: 1.

BRANDEGEE, T. S. 1880. Timber line in the Sawatch Range. Bot. Gaz. 5: 125-126.

Ecological notes about Engelmann spruce.

BRANDEGEE, T. S. 1899. Teton Forest Reserve. U.S. Geol. Surv. Ann. Rpt. 19, 1897-98, Part V-Forest reserves: 191-212.

BRANDEGEE, T. S. 1899. Yellowstone Park Forest Reserve. U.S. Geol. Surv. Ann. Rpt. 19, 1897-98, Part V-Forest reserves: 213-216.

Distribution; Engelmann spruce is not abundant.

BRAY, J. R., and G. J. STRUIK. 1963. Forest growth and glacial chronology in eastern British Columbia, and their relation to recent climatic trends. Can. Jour. Bot. 41: 1245-1271.

BRAYSHAW, T. C. 1953. An approach to the determination of moisture requirements for the germination of seeds of Douglas fir, ponderosa pine, and Engelmann spruce. Brit. Columbia Univ. Forest Club Res. Note 8, 6 pp.

BRIGHT, DONALD E., JR. 1963. Bark beetles of the genus Dryocoetes (Coleoptera: Scolytidae) in North America. Ent. Soc. Amer. Ann. 56: 103-115.

BRITISH COLUMBIA DEPT. LANDS. 1944. Report of the Forest Branch for the year ended December 31st, 1943. King's Printer, Victoria, B.C. 71 pp.

Experiment in selective logging of Engelmann spruce stand.

BRITISH COLUMBIA DEPT. LANDS AND FORESTS. 1953. Engelmann spruce bark-beetle. Rpt. 1952: 60.

BRITISH COLUMBIA DEPT. LANDS AND FORESTS. 1957. The forest resources of British Columbia. 2 vols. 888 pp.

BRITTON, NATHANIEL LORD, and JOHN ADOLPH SHAFER. 1908. North American trees. 894 pp. New York: Henry Holt.

General description of Engelmann spruce.

BROCKMAN, C. FRANK. 1933. The forests of Mt. Rainier. Nat. Hist. 33: 523-532.

Engelmann spruce is noticeable in certain locations of the subalpine regions.

BROCKMAN, C. FRANK. 1949. Trees of Mt. Rainier National Park. 49 pp. Seattle: Univ. Wash. Press.

BROWN, A. W. A. 1941. Foliage insects of spruce in Canada. Canada Dept. Agr., Forest Insects Invest. Div. Ent. Pub. 712, Tech. Bul. 31, 29 pp.

BROWN, A. W. A. (See Halliday and Brown. 1943)

BROWN, C. W., and W. C. HODGE. 1948. Forest resources of northern Montana. U.S. Forest Serv., North. Rocky Mountain Forest and Range Expt. Sta. Paper 13, 20 pp.

BROWN, C. W. (See Hodge, Brown, and Finch. 1949)

BROWNE, J. E. 1952. Decay of Engelmann spruce and balsam fir in the Bolean Lake area, B. C. 24 pp. Canada Dept. Agr., Sci. Serv., Forest Biol. Div.

Bruce, D. 1915. Further notes on frustrum form factor volume tables. Soc. Amer. Foresters Proc. 10: 315-321.

BRUSH, W. D. (See Collingwood and Brush. 1947)

BUCHANAN, HAYLE. 1960. The plant ecology of Bryce Canyon National Park. Ph.D. thesis. Univ. Utah, Salt Lake City.

Quantitative phytosociology data; phytosociological ordination.

BUELL, JESSE H. 1953. Problems facing forest management in the central Rocky Mountains. U.S. Forest Serv., Rocky Mountain Forest and Range Expt. Sta. Paper 13, 5 pp.

BUELL, JESSE H. 1954. Problems facing forest management in the central Rocky Mountains. Jour. Forestry 52: 163-165.

Forest management of even-aged and all-aged stands; Dendroctonus engelmanni damage in Colorado.

BUELL, JESSE H. (See Alexander and Buell. 1955)

BUFFAM, P. E. 1962. Observations on the effectiveness and biology of the European predator Laricobius erichsonii Rosen. (Coleoptera: Derodontidae) in Oregon and Washington. Can. Ent. 94: 461-472.

BURLISON, VERNON H. (See Johnson and Burlison. 1961)

BURNS, G. P. 1923. Measurement of solar radiant energy in plant habitats. Ecology 4: 189-195.

Compensation point determination for Engelmann spruce seedlings.

BUSHMAN, JOHN B. (See Behle, Bushman, and Greenhalgh. 1958)

BUSZEWICZ, G. (See Holmes and Buszewicz. 1956)

BUTLER, OVID M. 1923. The suitability of western species for cross-ties. Jour. Forestry 21: 475-482.

Discusses mechanical properties and durability of small wood specimens.

CAIN, STANLEY A. 1943. Sample-plot technique applied to alpine vegetation in Wyoming. Amer. Jour. Bot. 30: 240-247.

Describes sample-plot techniques; describes alpine plant communities; and provides quantitative phytosociology data.

CAMPO-DUPLAND, VAN, and H. GAUSSEN. 1948. Sur quatre hybrides de genres chez les Abietinées. Trav. Lab. for. Toulouse 1(4), Art. 24, p. 14.

Picea engelmanni X Tsuga hookeriana.

CANADA DEPT. NORTHERN AFFAIRS AND NATIONAL RESOURCES. 1956. Native trees of Canada, 5th Ed., Bul. 61, Ottawa. 293 pp.

CANADA DEPT. NORTHERN AFFAIRS AND NATIONAL RESOURCES. 1958. A forest classification for Canada Forestry Branch Forest Res. Div., Forestry Branch Bul. 89, 67 pp. (Rev. of Halliday, W. E. D. 1937.)

CARHART, ARTHUR H. 1949. Mass murder in the spruce belt. Amer. Forests 55(3): 14-15; 41-42.

Reports wholesale damage by the Engelmann spruce beetle.

CAROLIN, V. M., JR. (See Whiteside and Carolin. 1961)

CARY, MERRITT. 1911. A biological survey of Colorado. U.S. Dept. Agr., North Amer. Fauna, 33. 256 pp.

Community description.

CARY, MERRITT. 1917. Life zone investigations in Wyoming. U.S. Dept. Agr., North Amer. Fauna, 42. 95 pp.

CHANDLER, R. F. (See Lutz and Chandler. 1947)

CHEYNEY, E. G. 1937. Sylvics. Pp. 47, 94-95. Minneapolis: Burgess Pub. Co. 149 pp.

CHEYNEY, EDWARD G. 1942. American silvics and silviculture. 472 pp. Minneapolis: Univ. Minnesota Press.

Describes Picea engelmanni (pp. 332-334).

CHISHOLM, R. D. (See Massey, Chisholm, and Wygant. 1953)

CHOATE, CHARLU M. (See Habeck and Choate. 1963)

CHRISTENSEN, EARL M., and B. F. HARRISON. 1961. Ecological study area at Lily Lake in the Uinta Mountains, Utah. Utah Acad. Sci., Arts and Letters Proc. 38: 36-49.

Hydrarch succession; edaphic data; and community description.

CLARK, E. C., and J. A. SCHENK. 1962. Damage caused by the Engelmann spruce weevil in northern Idaho. Jour. Forestry 60: 821-823.

Pissodes engelmanni.

CLARK, J. D., L. W. W. LEHRLE, and J. H. G. SMITH. 1954. Scarification in Engelmann spruce-alpine fir forests. Brit. Columbia Dept. Lands and Forests, Forest Serv. Res. Note 25, 7 pp.

CLARK, JOE W. 1957. Comparative decay resistance of some common pines, hemlock, spruce, and true fir. Forest Sci. 3: 314-320.

Heartwood samples of Engelmann spruce showed low resistance to three test fungi: Poria monticola, Lenzites sepiaria, Lenzites trabea.

CLARK, M. B. 1958. Exploratory direct seeding studies, Kamloops Forest District. Brit. Columbia Forest Serv., Forest Res. Rev. 1957-58: 38-39.

CLARK, M. B. (See Smith and Clark. 1960)

CLEMENTS, F. E. 1910. The life history of lodgepole pine burn forests. U.S. Dept. Agr., Forest Serv. Bul. 79, 56 pp.

Succession following burns near Estes Park, Colorado.

CLEMENTS, F. E. 1916. Climax formations of North America. IN: Plant Succession. Carnegie Inst. Wash. Pub. 242, pp. 184-237.

Distribution of Engelmann spruce.

CLEMENTS, F. E. 1920. Plant indicators. Carnegie Inst. Wash. Pub. 290, 388 pp.

Discusses indicators of subalpine forest (pp. 223-228).

CLEMENTS, F. E., and G. W. GOLDSMITH. 1924. The phytometer method in ecology. The plant and community as instruments. Carnegie Inst. Wash. Pub. 356, 106 pp.

Transpiration and climatic data.

CLEMENTS, F. E. (See Weaver and Clements. 1938)

COLLINGWOOD, G. H., and W. D. BRUSH. 1947. Knowing your trees. 312 pp. Wash.: Amer. Forestry Assoc.

Distribution and characteristics of Engelmann spruce.

COMER, F. G. 1949. Logging damage in salvaging beetle-killed spruce stands. Master's thesis. Colo. State Univ., Fort Collins.

COOK, JERRY D. 1954. Some aspects of the reproduction of Engelmann spruce. Master's thesis. Univ. Wyo., Laramie.

COOPER, WILLIAM S. 1908. Alpine vegetation in vicinity of Long's Peak, Colorado. Bot. Gaz. 45: 319-337.

Community description and succession.

COOPER, W. S. 1916. Plant succession in the Mount Robson region, British Columbia. Plant World 19: 211-268.

Succession.

CORMACK, ROBERT G. H. 1949. A study of trout streamside cover in logged-over and undisturbed virgin spruce woods. Can. Jour. Res. C. 27: 78-95.

Distribution of Engelmann spruce.

CORMACK, ROBERT G. H. 1953. A survey of forest succession in the eastern Rockies. Forestry Chron. 29: 218-323.

COSTELLO, DAVID F. 1944. Important species of the major forage types in Colorado and Wyoming. Ecol. Monog. 14: 105-134.

Community description.

COSTELLO, DAVID F. 1954. Vegetation zones in Colorado. IN: Harrington, H. D. Manual of the plants of Colorado, pp. iii-x. Denver: Sagebooks.

Reports distribution of Engelmann spruce.

COSTELLO, DAVID F., and RAYMOND PRICE. 1939. Weather and plant-development data as determinants of grazing periods on mountain range. U.S. Dept. Agr. Tech. Bul. 686, 30 pp.

Relates distribution of the species in Ephraim Canyon, central Utah, to climatic data.

COTTAM, WALTER P. 1928. Preliminary studies of evaporation rates at various elevations on Mt. Timpanogos. Utah Acad. Sci. Proc. 5: 9-10.

Climatic data; Utah.

COTTAM, WALTER P. 1929. Some phytogeographic features of Utah. Utah Acad. Sci. Proc. 6: 6-7.

Discusses local distribution of Engelmann spruce.

COTTAM, WALTER P. 1930. Some unusual floristic features of the Uintah Mountains, Utah. Utah Acad. Sci. Proc. 7: 48-49.

Distribution of Engelmann spruce.

COTTAM, WALTER P. 1947. Is Utah Sahara bound? Univ. Utah Bul. 37(11), 40 pp.

Mentions distribution of Engelmann spruce in Utah.

COX, C. F. 1933. Alpine plant succession on James Peak, Colorado. Ecol. Monog. 3: 299-372.

Distribution of Engelmann spruce; succession.

COX, W. T. 1911. Reforestation on the National Forests. U.S. Dept. Agr., Forest Serv. Bul. 98, 57 pp.

Discusses reproduction of Engelmann spruce.

CRAIG, R. D. (See Whitford and Craig. 1918)

CUMMINGS, L. J., and PAUL D. KEMP. 1940. Forest increment in north Idaho. U.S. Forest Serv., North. Rocky Mountain Forest and Range Expt. Sta. Forest Surv. Release 18, 74 pp.

CURTIS, JAMES D. 1958. Germinative capacity of Engelmann spruce seed. U.S. Forest Serv., Intermountain Forest and Range Expt. Sta. Res. Note 58, 3 pp.

Reports tests for germinative capacity of seed collected from eight National Forests in the Intermountain region.

DALLIMORE, W., and A. BRUCE JACKSON. 1948. A handbook of Coniferae including Ginkgoaceae. 3d ed. 682 pp. London: Edward Arnold.

General description of Engelmann spruce and distribution of Engelmann spruce in Europe.

DANIEL, T. W. 1961. Rodent population of the spruce-fir type of Logan Canyon. Utah Acad. Sci., Arts and Letters Proc. 32: 35-36.

DANIEL, T. W. 1962. The middle and southern Rocky Mountain Region. IN: Barrett, John W. Regional silviculture of the United States. Chap. 8, pp. 334-405. New York: Ronald Press.

Review of silviculture.

DARROW, ROBERT A. 1944. Arizona range resources and their utilization, I. Cochise County. Ariz. Expt. Sta. Tech. Bul. 103, pp. 311-366. Tucson: Univ. Ariz.

Distribution of Engelmann spruce and range condition, trend, and grazing capacity of Engelmann spruce forests.

DAUBENMIRE, R. F. 1943. Vegetational zonation in the Rocky Mountains. Bot. Rev. 9: 325-393.

This review includes Engelmann spruce.

DAUBENMIRE, R. F. 1946. The life zone problem in the northern Intermountain region. Northwest Sci. 20: 28-38.

DAUBENMIRE, R. F. 1952. Forest vegetation of northern Idaho and adjacent Washington and its bearing on concepts of vegetation classification. Ecol. Monog. 22: 301-330.

Quantitative phytosociological data.

DAUBENMIRE, R. F. 1952. Plant geography of Idaho. IN: Davis, Ray J. Flora of Idaho. 17 pp. Dubuque, Iowa: Wm. C. Brown Co.

Distribution and community.

DAUBENMIRE, R. F. 1953. Classification of the conifer forests of eastern Washington and northern Idaho. Northwest Sci. 27: 17-24.

DAUBENMIRE, R. F. 1953. Nutrient content of leaf litter of trees in the northern Rocky Mountains. Ecology 34: 786-793.

DAUBENMIRE, R. F. 1956. Climate as a determinant of vegetation distribution in eastern Washington and northern Idaho. Ecol. Monog. 26: 131-154.

Compares climates of several plant communities.

DAUBENMIRE, R. F. 1957. Influence of temperature upon soil moisture constants and its possible ecologic significance. Ecology 38: 320-324.

Climatic data and soil moisture constants for high-altitude spruce-fir forests.

DAUBENMIRE, R. F., and M. E. DETERS. 1947. Comparative studies of growth in deciduous and evergreen trees. Bot. Gaz. 109: 1-12.

DAVIDSON, ROSS W. 1951. A deterioration problem in beetle-killed spruce in Colorado. Phytopathology 41: 560. (Abstract.)

DAVIDSON, ROSS W. 1954. Species of Ophiostomataceae associated with Engelmann spruce bark beetle. Phytopathology 44: 485.

Four fungus species adapted to insect dissemination.

DAVIDSON, ROSS W. 1955. Wood-staining fungi associated with bark beetles in Engelmann spruce in Colorado. Mycologia 47: 58-67.

Descriptions of the fungus diseases associated with the bark beetles.

DAVIDSON, ROSS W. 1958. Additional species of Ophiostomataceae from Colorado. Mycologia 50: 661-670.

Ceratocystis species associated with bark beetles in Engelmann spruce.

DAVIDSON, ROSS W. (See Mielke and Davidson. 1947)

DAVIDSON, ROSS W., and THOMAS E. HINDS. 1958. Unusual fungi associated with decay in some forest trees in Colorado. Phytopathology 48: 216-218.

DAVIS, K. P. (See Supplement, p. 37: Haig, David, and Weidmann. 1941)

DAY, R. J. 1963. Spruce seedling mortality caused by adverse summer microclimate in the Rocky Mountains. Pub. Dept. Forestry Canada 1003, 36 pp.

Picea engelmannii X P. glauca hybrid.

DAY, R. J. (See Supplement, p. 37: Day and Duffy. 1963)

DEARDEN, ELIZABETH RUTH. (See Jackson and Dearden. 1951)

DeGRACE, L. A. 1950. Selective logging of spruce in subalpine Alberta. Canada Dept. Resources and Development, Forestry Branch, Silvic. Res. Note 96, 15 pp.

DeGRACE, L. A. 1950. Management of spruce on east slope of Canadian Rockies. Canada Dept. Resources and Development, Forestry Branch, Forest Res. Silvic. Res. Note 97, 55 pp.

DeGRACE, L. A., E. W. ROBINSON, and J. H. G. SMITH. 1952. Marking of spruce in the Fort George Forest District. Dept. Lands and Forests, Brit. Columbia Forest Serv. Res. Note 20, 13 pp.

DETERS, M. E. (See Daubenmire and Deters. 1947)

DETERS, MERRIL E. 1962. The northern Rocky Mountain region. IN: Barrett, John W. Regional silviculture of the United States. Chap. 9: 406-459. New York: Ronald Press.

Review of silviculture.

DICKERMAN, M. B. (See Kemp and Dickerman. 1950)

DIXON, HELEN. 1935. Ecological studies on the high plateaus of Utah. Bot. Gaz. 97: 272-320.

Community description and distribution.

DODWELL, ARTHUR. (See Langille et al. 1903; Leiberg, Rixon, and Dodwell, 1904; and Plummer, 1904)

DOHR, A. W. (See Drow, Paul, and Dohr. 1955)

DROW, JOHN T. 1953. Mechanical properties of Engelmann spruce. U.S. Forest Serv., Forest Prod. Lab. Rpt. 1944-4, 2 pp.

DROW, JOHN T., B. H. PAUL, and A. W. DOHR. 1955. Strength-related properties of Wyoming Douglas fir, Engelmann spruce, lodgepole pine. U.S. Forest Serv., Forest Prod. Lab. TM-98, 12 pp.

DRUMMOND, JOHN. 1956. Trees native to Montana. Mont. State Col. Ext. Serv. Bul. 257, Revised, 48 pp.

Description and distribution map of Engelmann spruce.

DUFFY, P. J. B. (See Supplement, p. 37: Day and Duffy. 1963)

DUNFORD, E. G. 1952. Some relationships between timber cutting and snow storage in the Rocky Mountains. Jour. Colo.-Wyo. Acad. Sci. 4(4): 71. (Abstract.)

DUNN, PAUL M. 1940. Tree planting survey on some watershed areas. Utah Acad. Sci., Arts and Letters Proc. 17: 7. (Abstract.)

Engelmann spruce recommended for planting above 7,800 feet in northern Utah.

DURRELL, L. W. 1917. Notes on some North American conifers based on leaf characters. Iowa Acad. Sci. Proc. 24: 519-582.

DWIGHT, T. W. 1913. Forest conditions in the Rocky Mountains Forest Reserve. Canada Dept. Int., Forestry Branch Bul. 33, 62 pp.

EADES, H. W. 1932. British Columbia softwoods: Their decays and natural defects. Canada Dept. Int., Forest Serv. Bul. 80, 126 pp.

EHRLICH, JOHN. (See Pierson and Ehrlich. 1937)

ELIASON, E. J. (See Heit and Eliason. 1940)

ELIOT, W. A. 1938. Forest trees of the Pacific Coast. 565 pp. New York: G. P. Putnam's Sons.

Distribution and characteristics of Engelmann spruce.

ELLISON, LINCOLN. 1954. Subalpine vegetation of the Wasatch Plateau, Utah. Ecol. Monog. 24: 89-184.

Quantitative data on community composition; successional trends and soil characteristics.

ELLISON, LINCOLN. 1960. Influence of grazing on plant succession of rangelands. Bot. Rev. 26: 1-78.

Review of succession.

ELLISON, LINCOLN. (See Lull and Ellison. 1950)

ELWES, HENRY JOHN, and AUGUSTINE HENRY. 1906-13. The trees of Great Britain and Ireland. 8 vols., 2022 pp. Privately printed, Edinburgh.

Picea engelmanni (pp. 1387-1389); synonomy; general information; and description.

ENSIGN, E. T. 1889. Report on the forest conditions of the Rocky Mountains, especially in the State of Colorado, the Territories of Idaho, Montana, Wyoming, and New Mexico. U.S. Dept. Agr. Div. Forestry Bul. 2: 41-152.

ERDMAN, KIMBALL S. 1961. Classification and distribution of the native trees of Utah. Master's thesis. Brigham Young Univ., Provo, Utah.

ETHERIDGE, D. E. 1953. Decay of subalpine spruce on the Rocky Mountains forest reserves in Alberta. Canada Dept. Agr., Div. Forest Biol. Bimo. Prog. Rpt. 9(6): 3.

ETHERIDGE, D. E. 1956. Decay in subalpine spruce on the Rocky Mountain Forest Reserve in Alberta. Can. Jour. Bot. 34: 805-816.

Describes the most economically important fungus diseases affecting Engelmann spruce.

ETHERIDGE, D. E. 1958. Decay losses in subalpine spruce on the Rocky Mountain Forest Reserve in Alberta. Forestry Chron. 34: 116-131.

EVANS, R. B. (See Price and Evans. 1937)

FAHNESTOCK, GEORGE R. (See Olson and Fahnestock. 1955)

FENSOM, K. G. 1959. The characteristics and significance of spruce. Forest Prod. Lab., Vancouver. 21 pp.

FERNOW, B. E. 1912. Forest resources and problems of Canada. Soc. Amer. Foresters Proc. 7: 133-144.

Engelmann spruce is characteristic of the "southern Rocky Mountain type."

FETHEROLF, JAMES M. 1917. Aspen as a permanent forest type. Jour. Forestry 15: 757-760.

Distribution of Engelmann spruce; succession and community taxonomy.

FETHEROLF, N. J. (See Baker, Korstian, and Fetherolf. 1921; and Korstian and Fetherolf, 1921)

FICHTER, E. 1939. An ecological study of Wyoming spruce-fir forest arthropods with special reference to stratification. Ecol. Monog. 9: 183-215.

Community description.

FINCH, THOMAS L. 1948. Effect of bark growth in measurement of periodic growth of individual trees. U.S. Forest Serv., North. Rocky Mountain Forest and Range Expt. Sta. Res. Note 60, 3 pp.

FINCH, THOMAS L. 1951. How fast is timber growing in Eastern Montana? U.S. Forest Serv., North. Rocky Mountain Forest and Range Expt. Sta. Res. Note 88, 7 pp.

Data on volume growth.

FINCH, THOMAS L. (See Hodge, Brown, and Finch. 1949)

FINCH, THOMAS L., W. C. HODGE, and M. E. METCALF. 1950. Forest resources of south central Montana. U.S. Forest Serv., North. Rocky Mountain Forest and Range Expt. Sta. Paper 23, 18 pp.

FISHER, GEORGE M. 1935. Comparative germination of tree species on various kinds of surface-soil material in the western white pine type. Ecology 16: 606-611.

Reproduction study.

FITZGERALD, O. A. 1954. Beetle proofing the big timber country. Amer. Forests 60(1): 24-25, 53-56.

FLEMING, WALTER E., FRANCIS E. BAKER, and LOUIS KOBLITZKY. 1937. Effect of applying acid lead arsenate for control of Japanese beetle larvae on the germination and development of evergreen seedlings. Jour. Forestry 35: 679-688.

Did not affect germination of Engelmann spruce seeds, but retarded seedling growth.

FOILES, M. W. 1961. Effects of thinning seed spots on growth of three conifers in the Inland Empire. Jour. Forestry 59: 501-503.

Number of seedlings per spot affected diameter growth of 17-year-old Engelmann spruce, western white pine, and ponderosa pine.

FORBES, R. D. (Ed.) 1956. Forestry Handbook. New York: Ronald Press. Variously paged.

Yield and volume data.

FOSTER, J. H. (See Hodson and Foster. 1910)

FRANKLIN, JERRY F., and JAMES M. TRAPPE. 1963. Plant communities of the northern Cascade Range: A reconnaissance. Northwest Sci. 37: 163-164. (Abstract.)

FREYTAG, GEORGE F., and JOHN F. REED. 1948. Specific differences in the resin sac pattern in the needles of Engelmann spruce and Colorado blue spruce. Jour. Colo.-Wyo. Acad. Sci. 3(6): 39-40.

FREYTAG, GEORGE F. (See Reed and Freytag. 1949)

FRÖLICH, H. J. 1957. Züchtungsarbeiten im Lehrforstamt Gahrenberg. (Tree breeding in the Gahrenberg instructional forest.) Forstarchiv 28: 170-175.

Provenance trials.

FROST, F. (See Bathen and Frost. 1951)

FROTHINGHAM, E. H. 1909. Douglas fir: A study of the Pacific Coast and Rocky Mountain forms. U.S. Dept. Agr., Forest Serv. Cir. 150, 38 pp.

Community data.

FUNK, B. 1950. Blitz of the beetles. Reader's Digest 56: 100-102.

FURNISS, MALCOLM M. 1957. Entomological aspects of the 1955 southern Idaho spruce budworm control project. U.S. Forest Serv.,

Intermountain Forest and Range Expt. Sta. Misc. Pub. 10, 22 pp.

GANNETT, HENRY. 1902. The forests of Oregon. U.S. Dept. Int., Geol. Surv. Prof. Paper 4, 36 pp.

Distribution of Engelmann spruce in Oregon; composition of forest based on volume (B.M.)

GARDNER, J. A. F. (See Barton and Gardner. 1957)

GARMAN, E. H. 1957. The occurrence of spruce in the interior of British Columbia. Dept. Lands and Forests, Brit. Columbia Forest Serv. Tech. Pub. T. 49, 31 pp.

Morphological and distributional study of spruce populations in British Columbia.

GARRETT, A. O. 1937. The Uredinales or rusts of Utah. Univ. Utah Bul. 28(7), Biol. Ser. 4(1), 81 pp.

Melampsorella cerastii (Aecidium coloradense) on Engelmann spruce.

GAUSSEN, H. (See Campo-Dupland and Gaussen. 1948)

GHISELIN, JON BREWSTER. 1956. Ecological distribution and frequency of occurrence of summer birds of the high western Uinta Mountains, Utah. Master's thesis. Univ. Utah, Salt Lake City.

Community description.

GIBSON, H. H. 1913. American forest trees. Hardwood Record, Chicago 1913. 708 pp. Chicago: Regan Printing House.

General information on Engelmann spruce.

GILBERTSON, R. L., C. D. LEAPHART, and F. D. JOHNSON. 1961. Field identification of roots of conifers in the Inland Empire. Forest Sci. 7: 352-356.

GILL, LAKE S. 1935. Arceuthobium in the United States. Conn. Acad. Arts and Sci. Trans. 32: 111-245.

Arceuthobium campylopodum on Engelmann spruce in nature; Arceuthobium douglasii artificially grown on Engelmann spruce.

GILL, LAKE S. 1949. Shade trees for the Rockies. IN: U.S. Dept. Agr., Trees, Yearbook of Agriculture, 1949, pp. 72-76.

Emphasizes the importance of trees as a basic resource to the Nation.

GLOCK, WALDO S., R. A. STUDHALTER, and SHARLENE R. AGERTER. 1960. Classification and multiplicity of growth layers in the branches of trees. Smithsonian Misc. Coll. 140(1), 294 pp.

Includes analysis of growth layers of annual increments.

GOLDSMITH, G. W. (See Clements and Goldsmith. 1924)

GOLDSMITH, G. W., and J. H. C. SMITH. 1926. Some physico-chemical properties of spruce sap and their seasonal and altitudinal variation. Colo. Col. Pub. Sci. Ser. 13(2): 13-71.

GOODELL, BERTRAM C. 1958. A preliminary report on the first year's effects of timber harvesting on water yield from a Colorado watershed. U.S. Forest Serv., Rocky Mountain Forest and Range Expt. Sta. Paper 36, 12 pp.

Community.

GOODELL, B. C. (See Love and Goodell. 1960)

GOODMAN, G. J. 1950. A new variety of Engelmann spruce. Madroño 10(6): 177-178.

Description of Picea engelmanni var. glabra from the Medicine Bow Mountains in southeastern Wyoming.

GORMAN, MARTIN W. 1899. Eastern part of Washington Forest Reserve. U.S. Geol. Surv. Ann. Rpt. 19, 1897-98, Part V-Forest reserves: 315-350.

Distribution and community.

GOWSELL, M. G. (See Plummer and Gowsell. 1904)

GRAHAM, DONALD P. (See Hawksworth and Graham. 1963)

GRAHAM, EDWARD H. 1937. Botanical studies in the Uinta Basin of Utah and Colorado. Carnegie Museum Annals, Pittsburgh, vol. 26, 432 pp.

Community description.

GRAY, A., and J. D. HOOKER. 1880. The vegetation of the Rocky Mountain Region and

a comparison with that of other parts of the world. U.S. Geol. and Geog. Surv. Bul. 6: 1-77.

GREELEY, WILLIAM B. 1913. Reforestation on the National Forests. Soc. Amer. Foresters Proc. 8: 261-277.

Engelmann spruce grown in nurseries for reforestation in Rocky Mountain region.

GREELEY, W. B. (See Thompson and Greeley. 1929)

GREENHALGH, CLIFTON M. (See Behle, Bushman, and Greenhalgh. 1958)

GREGORY, HERBERT E. 1916. The Navajo country. A geographic and hydrographic reconnaissance of parts of Arizona, New Mexico, and Utah. U.S. Dept. Int., Geol. Surv. Water Supply Paper 380, 219 pp.

Discusses distribution of Engelmann spruce and presents climatic data.

GREGORY, HERBERT E. 1938. The San Juan country. A geographic and geologic reconnaissance of southeastern Utah. U.S. Dept. Int., Geol. Surv. Prof. Paper 188, 123 pp.

Discusses distribution of and lists species occurring with Engelmann spruce.

GREGORY, HERBERT E. 1949. Geologic and geographic reconnaissance of eastern Markagunt Plateau, Utah. Geol. Soc. Amer. Bul. 60: 969-998.

Discusses distribution of Engelmann spruce.

GREGORY, HERBERT E. 1950. Geology and geography of the Zion Park Region, Utah and Arizona. U.S. Dept. Int., Geol. Surv. Prof. Paper 220, 200 pp.

Discusses distribution of Engelmann spruce.

GREGORY, HERBERT E. 1950. Geology of eastern Iron County, Utah. Utah Geol. and Mineralogical Surv. Bul. 37, 153 pp. Salt Lake City: Univ. Utah.

Discusses distribution of Engelmann spruce.

GRIFFITH, B. G. 1931. The natural regeneration of spruce in central British Columbia. Forestry Chron. 7(4): 204-219.

GRIFFITH, B. G. 1940. Spruce regeneration in British Columbia. Forestry Chron. 16: 83-84.

HAASIS, FERDINAND W. 1928. Germinative energy of lots of coniferous tree seed, as related to incubation temperature and to duration of incubation. Plant Physiol. 3: 365-412.

HABECK, JAMES R., and CHARLU M. CHOATE. 1963. An analysis of krummholz communities at Logan Pass, Glacier National Park. Northwest Sci. 37: 165-166. (Abstract.)

Succession and community composition.

HAEUSSLER, G. J. 1952. Insects as destroyers. IN: U.S. Dept. Agr., Insects, Yearbook of Agriculture, 1952: 141-146.

Twenty percent of the Engelmann spruce timber in Colorado was destroyed by Engelmann spruce beetle from 1940 to 1946.

HAHN, GLEN G. (See Hartley, Pierce, and Hahn. 1919)

HAIG, I. T. (See Supplement, p. 37: Haig, Davis, and Weidmann. 1941)

HALLIDAY, W. E. D. 1937. A forest classification for Canada. Canada Dept. Int., Forest Serv. Bul. 89.

Community description.

HALLIDAY, W. E. D., and A. W. A. BROWN. 1943. The distribution of some important forest trees in Canada. Ecology 24: 353-373.

Distribution and history of forest trees.

HANNA, L. A. 1934. The major plant communities of the headwater area of the Little Laramie River, Wyoming. Univ. Wyo. Pub. Bot. 1: 243-266.

Community description.

HANSEN, H. P. 1938. Ring growth and reproduction cycle in Picea engelmanni near timberline. Univ. Wyo. Pub. 5: 1-19.

HANSEN, H. P. 1939. Pollen analysis of a bog near Spokane, Washington. Torrey Bot. Club Bul. 66: 215-220.

Distribution; discusses forest succession.

HANSEN, H. P. 1940. Ring growth and dominance in a spruce fir association in southern Wyoming. Amer. Midland Nat. 23: 442-447.

Community description, reproduction, and succession.

HANSEN, H. P. 1941. A pollen study of post-Pleistocene lake sediments in the Upper

Sonoran life zone of Washington. Amer. Jour. Sci. 239: 503-522.

Discusses postglacial plant succession.

HANSEN, H. P. 1943. A pollen study of a subalpine bog in the Blue Mountains of northeastern Oregon. Ecology 24: 70-78.

HANSEN, H. P. 1948. Postglacial forests of the Glacier National Park Region. Ecology 29: 146-152.

Discusses postglacial succession.

HANZLIK, E. J. 1927. Engelmann spruce and lodgepole pine. Four L Lumber News 9(19): 8, 40-41.

HANZLIK, E. J. 1928. Trees and forests of the western United States. 128 pp. Portland: Dunham.

HARLOW, WILLIAM M., and ELWOOD S. HARRAR. 1958. Textbook of dendrology, 4th ed., 561 pp. New York: McGraw-Hill Book Co., Inc.

HARRAR, ELWOOD S. (See Harlow and Harrar. 1958)

HARRINGTON, H. D. 1954. Manual of the plants of Colorado. 666 pp. Denver: Sage Books.

Taxonomy of Colorado plants.

HARRISON, B. F. (See Christensen and Harrison. 1961)

HARSHBERGER, JOHN W. 1958. Phytogeographic survey of North America. 790 pp. 2d (Reprint) ed. Weinheim/Bergstr., Germany: H. R. Engelmann (J. Cramer).

HARTLEY, CARL. 1921. Damping-off in forest nurseries. U.S. Dept. Agr. Bul. 934, 99 pp.

Relative susceptibility to damping-off of different conifer species.

HARTLEY, CARL, and ROY G. PIERCE. 1917. The control of damping-off of coniferous seedlings. U.S. Dept. Agr. Bul. 453, 32 pp.

Soil-disinfection tests on Engelmann spruce in Colorado and New Mexico.

HARTLEY, CARL, T. C. MERRILL, and A. S. RHOADS. 1918. Seedling diseases of conifers. Jour. Agr. Res. 15: 521-558.

Discusses damping-off in Engelmann spruce seedlings.

HARTLEY, CARL. (See Rhoads et al. 1918)

HARTLEY, CARL, ROY G. PIERCE, and GLEN G. HAHN. 1919. Moulding of snow-smothered nursery stock. Phytopathology 9: 521-531.

Botrytis cinerea; Pestalozyia sp.

HATT, ROBERT T. 1943. The pine squirrel in Colorado. Jour. Mammal. 24: 311-345.

Reports use of Engelmann spruce as food by pine squirrel and distribution of pine squirrel in Engelmann spruce stands.

HAWKSWORTH, FRANK G., and DONALD P. GRAHAM. 1963. Dwarfmistletoes on spruce in the western United States. Northwest Sci. 37: 31-38.

HAWKSWORTH, FRANK G., and THOMAS E. HINDS. 1959. Progress report on the rate of deterioration of beetle-killed Engelmann spruce in Colorado. U.S. Forest Serv., Rocky Mountain Forest and Range Expt. Sta. Res. Note 36, 6 pp.

HAWKSWORTH, FRANK G., and THOMAS E. HINDS. 1960. Cytospora canker of Engelmann spruce in Colorado. Plant Dis. Rptr. 44: 72.

HAYWARD, C. LYNN. 1945. Biotic communities of the southern Wasatch and Uinta Mountains. Great Basin Nat. 6: 1-124.

Community description.

HAYWARD, C. LYNN. 1952. Alpine biotic communities of the Uinta Mountains, Utah. Ecol. Monog. 22: 93-120.

Description of spruce-fir zone is included.

HAYWARD, C. LYNN. (See Tanner and Hayward. 1934)

HEDGCOCK, GEORGE GRANT. 1912. Notes on some diseases of trees in our national forests. II. Phytopathology 2: 73-80.

Reports on several diseases of Engelmann spruce.

HEDGCOCK, GEORGE GRANT. 1912. Notes on some western Uredineae which attack forest trees. Mycologia 4: 141-147.

Discusses Peridermium coloradense, Peridermium conorum-picea, and Trametes pini on Engelmann spruce.

HEDGCOCK, GEORGE GRANT. 1913. Notes on western Uredinea which attack forest trees. II. Phytopathology 3: 15-17.

Discusses Peridermium coloradense on Engelmann spruce.

HEDGCOCK, GEORGE GRANT. 1913. Notes on some diseases of trees in our national forests. III. Phytopathology 3: 111-114.

Reports on winter injury to Engelmann spruce.

HEDGCOCK, GEORGE G. 1914. Notes on some diseases of trees in our national forests. IV. Phytopathology 4: 181-188.

Discusses Herpotrichia nigra, Fomes pinicola, and Fomes roseus on Engelmann spruce.

HEDGCOCK, GEORGE G. 1932. Notes on the distribution of some fungi associated with diseases of conifers. Plant Dis. Rptr. 16: 28-42.

HEDGCOCK, GEORGE G. (See Rhoads et al. 1918)

HEDGCOCK, G. G. (See Scheffer and Hedgcock. 1955)

HEIM, A. L. (See Betts and Heim. 1914)

HEIT, C. E. 1949. Physiology of germination. N. Y. State Agr. Expt. Sta. Rpt., pp. 42-45.

Discusses germination of Engelmann spruce.

HEIT, C. E., and E. J. ELIASON. 1940. Coniferous tree seed testing and factors affecting germination and seed quality. N.Y. State Agr. Expt. Sta. Tech. Bul. 255, 45 pp.

One lot of Engelmann spruce was tested.

HELMERS, AUSTIN E. 1946. Fifth-year results of direct seeding with western redcedar and Engelmann spruce. U.S. Forest Serv., North. Rocky Mountain Forest and Range Expt. Sta. Res. Note 24, 4 pp.

HELMERS, AUSTIN E. (See Schopmeyer and Helmers. 1947)

HENRY, AUGUSTINE. (See Elwes and Henry. 1906-1913.

HENRY, L. K. 1936. Mycorrhizae from the Uinta Basin. Carnegie Museum Annals (Pittsburgh) 25: 63-72.

HINDS, THOMAS E. (See Davidson and Hinds, 1958; and Hawksworth and Hinds 1959, 1960)

HODGE, W. C. (See Brown and Hodge, 1948; and Finch, Hodge, and Metcalf, 1950)

HODGE, W. C., C. W. BROWN, and T. L. FINCH. 1949. Forest resources of southern Montana. U.S. Forest Serv., North. Rocky Mountain Forest and Range Expt. Sta. Paper 20, 19 pp.

HODSON, ELMER REED. 1908. A new characteristic of Engelmann spruce. Bot. Gaz. 46: 386.

Resin vesicles in bark.

HODSON, E. R., and J. H. FOSTER. 1910. Engelmann spruce in the Rocky Mountains. U.S. Dept. Agr., Forest Serv. Cir. 170, 23 pp.

Includes quantitative community data and information on growth, reproduction, and silvical characteristics of Engelmann spruce; discusses effect of fire on Engelmann spruce.

HOFF, C. C. 1957. A comparison of soil, climate, and biota of conifer and aspen communities in the central Rocky Mountains. Amer. Midl. Nat. 58: 115-140.

Reports on communities in Wyoming and Colorado.

HOFMANN, J. V. 1917. Natural reproduction from seed stored in the forest floor. Jour. Agr. Res. 11: 1-26.

Reports on reproduction following a burn; Engelmann spruce accounted for 1% of the reproduction.

HOFMANN, J. V. 1922. Engelmann spruce. Timberman 23: 9.

HOLMES, G. D., and G. BUSZEWICZ. 1958. The storage of seed of temperate forest tree species. Forestry Abs. 19:313-322, 455-476.

Reviews storage of tree seed.

HOPKINS, A. D. 1905. The Black Hills beetle. U.S. Bur. Ent. Bul. 56, 24 pp.

HOPKINS, A. D. 1906. Barkbeetle depredations of some fifty years ago in the Pikes Peak region of Colorado. Ent. Soc. Wash. Proc. 8: 4-5.

HOPKINS, A. D. 1908. Notable depredations by forest insects. U.S. Dept. Agr. Yearbook, 1907: 149-164.

HOPKINS, A. D. 1909. Contributions toward a monograph of the scolytid beetles. I. The genus Dendroctonus. U.S. Bur. Ent. Tech. Ser. 17, Part 1, 164 pp.

HOPKINS, A. D. 1909. Practical information on the Scolytid beetles of North American forests. I. Bark beetles of the genus Dendroctonus. U.S. Bur. Ent. Bul. 83, 169 pp.

HOPPING, GEORGE R. 1946. Control of the more injurious bark beetles of the Canadian Rocky Mountain region. Canada Dept. Agr., Sci. Serv., Div. Ent. Pub. 49, 7 pp.

HOPPING, GEORGE R. 1950. Timber types in relation to insect outbreaks in the Canadian Rocky Mountains. Ontario Ent. Soc. 81st Ann. Rpt., 72-75. (Canada Dept. Agr., Div. Ent., Sci. Serv., Contrib. 2768.)

HORNIBROOK, E. M. 1942. Yield of cutover stands of Engelmann spruce. Jour. Forestry 40: 778-781.

Presents equation for estimating future yield.

HORNIBROOK, E. M. 1948. Merchantable height volume table for Engelmann spruce. U.S. Forest Serv., Rocky Mountain Forest and Range Expt. Sta. Res. Note 3, 2 pp.

HORNIBROOK, E. M. 1950. Estimating defect in mature and overmature stands of three Rocky Mountain conifers. Jour. Forestry 48: 408-417.

Describes defects, particularly those due to fungi (rots). Discusses methods useful in estimating defects.

HORNIBROOK, E. M. (See Taylor and Hornibrook. 1937)

HORTON, K. W. 1956. The ecology of lodgepole pine in Alberta and its role in forest succession. Canada Dept. North. Affairs and Natl. Resources, Forestry Branch, Forest Res. Div. Tech. Note 45, 29 pp.

HORTON, K. W. 1959. Characteristics of subalpine spruce in Alberta. Canada Dept. North. Affairs and Natl. Resources, Forestry Branch, Forest Res. Div. Tech. Note 76, 20 pp.

Discusses reproduction, community, description, and hybrids between white and Engelmann spruce.

HOTTES, F. C. 1961. A new species of Cinara from Colorado (Aphididae). Great Basin Nat. 21: 17-19.

Discusses Cinara caliginosa, n. sp. on Engelmann spruce.

HOTTES, F. C. 1961. A review and key of North American Cinara (Homoptera: Aphididae) occurring on Picea. Great Basin Nat. 21: 35-50.

HUBERT, ERNEST E. (See Weir and Hubert. 1918)

HUGHES, JAY M. 1962. Pulp- and papermaking opportunities in west central Colorado. U.S. Forest Serv. Rocky Mountain Forest and Range Expt. Sta. Paper 73, 48 pp.

Engelmann spruce statistics.

HUTCHISON, FRANK T. 1952. The effects of woodpeckers on the Engelmann spruce beetle Dendroctonus engelmanni Hopkins. Master's thesis. Colo. State Univ., Fort Collins.

IVES, RONALD L. 1942. Atypical subalpine environment. Ecology 23: 89-96.

Reports on "Alpine rain forests" in Colorado and on climate and community.

JACK, JOHN G. 1900. Pikes Peak, Plum Creek, and South Platte Reserves. U.S. Geol. Surv. Ann. Rpt. 20, 1898-99, Part V-Forest reserves: 39-115.

JACKSON, A. BRUCE. (See Dallimore and Jackson. 1948)

JACKSON, H. S. 1917. A species of Chrysomyxa new to North America. Phytopathology 7: 78.

This species causes a disease of the leaves of Engelmann spruce.

JACKSON, H. S. 1917. Two new forest tree rusts from the northwest. Phytopathology 7: 352-355.

Discusses Chrysomyxa weirii sp. nov. on Engelmann spruce.

JACKSON, H. S., and ELIZABETH RUTH DEARDEN. 1951. Studies of North American Telephoraceae. I. Some new western species of Peniophora. Mycologia 43: 54-61.

Discusses Peniophora munda on Engelmann spruce stump in Wyoming.

JACOBS, M. C. (See McDougall and Jacobs. 1927)

JAMES, CORLAND L. (See Roe and James. 1959)

JEMISON, G. M. (See LeBarron and Jemison. 1953)

JENSEN, A. W. 1906. The Manti Forest Reserve: Description of a typical reservation in Utah. Forests and Irrig. 12: 291-293.

Reports distribution of Engelmann spruce and history of use and establishment of the Manti Forest.

JEPSON, WILLIS LINN. 1909. Engelmann spruce near the California line. Muhlenbergia 5: 64.

Discusses distribution of Engelmann spruce.

JEPSON, WILLIS LINN. 1923. A conifer new to California. Madroño 1: 116.

Discusses distribution of Engelmann spruce.

JOHNSON, A. W. 1957. Ecology of subalpine forest communities in the Silver Lake Valley of the Front Range in Colorado. Dissert. Abs. 17: 2779.

Includes community and succession.

JOHNSON, FREDERIC D., and VERNON H. BURLISON. 1961. Native trees of Idaho. Univ. Idaho, Moscow, Idaho Agr. Ext. Serv. Bul. 289, 32 pp.

Description and map of distribution of Engelmann spruce in Idaho.

JOHNSON, F. D. (See Gilbertson, Leaphart, and Johnson. 1961)

JOHNSON, K. RICHARD. 1936. Ecology of a glacial lake in central Colorado. Univ. Colo. Studies 23(3): 235-243.

Includes community description and report on hydrarch succession.

JOHNSON, K. RICHARD. 1939. Plant ecology of northwestern Colorado lakes and surrounding areas. Ph.D. thesis. Colo. Univ., Boulder.

JONES, M. E. 1910. The origin and distribution of the flora of the Great Plateau. Contrib. to Western Botany 13: 46.

Discusses distribution of Engelmann spruce.

JØRGENSEN, M. B. 1955. Træer på Grønland. Horticultura, København 9(2): 25-30.

Plantations and nurseries in Greenland.

KARTCHNER, JAMES A. 1938. A study of forest tree insects of Utah. Master's thesis. Brigham Young Univ., Provo, Utah.

Report on insects and insect diseases of Engelmann spruce.

KAUFFMAN, C. H. 1921. The mycological flora of the higher Rockies of Colorado. Mich. Acad. Sci., Arts and Letters Papers: 1: 101-150.

KEEN, F. P. 1952. Bark beetles in forests. IN: U.S. Dept. Agr., Insects, Yearbook of Agriculture, 1952: 688-694.

Note on Engelmann spruce beetle in Colorado.

KEEN, F. P. 1952. Insect enemies of western forests (Revised). U.S. Dept. Agr. Misc. Pub. 273, 280 pp., illus.

KELLOGG, L. F. 1927. The natural occurrence of Engelmann spruce in California. Jour. Forestry 25: 73-78.

Discusses reproduction of Engelmann spruce; this species occurs in Shasta County in a narrow belt along a creek bottom.

KEMP, PAUL D. (See Cummings and Kemp. 1940)

KEMP, PAUL D., and M. B. DICKERMAN. 1950. Montana forest resource and industry statistics. U.S. Forest Serv., North. Rocky Mountain Forest and Range Expt. Sta. Paper 25, 48 pp.

Volume of live sawtimber and primary growing stock; area of commercial forest by stand-size classes.

KEPLINGER, PETER. (See Bates, Notestein, and Keplinger. 1914)

KERN, FRANK DUNN. (See Arthur and Kern. 1906)

KIERULF, T. 1958. Plantningene på Horta. Tidsskr. Skogbr. 66: 109-112.

Discusses plantations in Norway.

KIRKWOOD, J. E. 1918. The conifers of the northern Rockies. U.S. Dept. Int., Bur. Educ. Bul. 53, 61 pp.

KIRKWOOD, J. E. 1922. Forest distribution in northern Rocky Mountains. Mont. State Univ. Bul. 247, Studies Ser. 2, 180 pp. Missoula, Mont.

Discusses distribution of Engelmann spruce.

KIRKWOOD, J. E. 1930. Northern Rocky Mountain trees and shrubs. 340 pp. Stanford Univ., Calif.: Stanford Univ. Press.

KLEIN, C. J. (See Allison and Klein. 1961)

KNIGHT, F. B. 1957. The effects of woodpeckers on populations of the Engelmann spruce beetle. Jour. Colo.-Wyo. Acad. Sci. 4: 47-48.

KNIGHT, F. B. 1958. Effects of woodpeckers on populations of the Engelmann spruce beetle. Jour. Econ. Ent. 51: 603-607.

KNIGHT, F. B. 1960. Measurement of Engelmann spruce beetle populations. Ecology 41: 249-252.

Methods of measuring beetle populations.

KNIGHT, F. B. 1960. Sequential sampling of Engelmann spruce beetle infestation in standing trees. U.S. Forest Serv. Rocky Mountain Forest and Range Expt. Sta. Res. Note 47, 4 pp.

Reports on Dendroctonus engelmanni.

KNIGHT, F. B. 1961. Variations in the life history of the Engelmann spruce beetle. Ent. Soc. Amer. Ann. 54: 209-214.

Descriptions of the life cycle of the Engelmann spruce beetle.

KNIGHT, F. B., W. F. McCAMBRIDGE, and B. H. WILFORD. 1956. Estimating Engelmann spruce beetle infestations in the central Rocky Mountains. U.S. Forest Serv., Rocky Mountain Forest and Range Expt. Sta. Paper 25, 12 pp.

Outlines survey method.

KNIGHT, F. B. (See Nagel, McComb, and Knight. 1957)

KNIGHT, H. A. W. 1958. Gibberellic acid application to Engelmann spruce seedlings. Brit. Columbia Forest Serv., Forest Res. Rev. 1957-58: 34-35.

KNOWLTON, G. F. 1930. Notes on Utah Lachnea (Aphididae). Can. Ent. 62: 152-161.

Reports on Lachnus found on Engelmann spruce.

KOBLITZKY, LOUIS. (See Fleming, Baker, and Koblitzky. 1937)

KORSTIAN, CLARENCE F. 1921. Effect of a late spring frost upon vegetation in the Wasatch Mountains of Utah. Ecology 2:47-52.

Describes injury to Engelmann spruce seedings in nursery and also to native trees due to frost.

KORSTIAN, CLARENCE F. 1921. Relation of precipitation to height growth of forest tree saplings. Utah Acad. Sci. Trans. 2:260-267.

Discusses growth of leaves of Engelmann spruce.

KORSTIAN, CLARENCE F. 1923. Control of snow molding in coniferous nursery stock. Jour. Agr. Res. 24: 741-748.

Reports on diseases in nursery stock.

KORSTIAN, CLARENCE F. 1924. Density of cell sap in relation to environmental conditions in the Wasatch Mountains of Utah. Jour. Agr. Res. 28: 845-907.

Discusses osmotic pressure of cell sap under different conditions, climatic data, and available soil moisture data.

KORSTIAN, CLARENCE F. 1925. Some ecological effects of shading coniferous nursery stock. Ecology 6: 48-51.

Germination and survival of Engelmann spruce in a nursery related to shading.

KORSTIAN, CLARENCE F., and F. S. BAKER. 1925. Forest planting in the Intermountain region. U.S. Dept. Agr., Dept. Bul. 1264, 56 pp.

Reports on Engelmann spruce: seed yield and germination period; distribution; sites suitable for planting; and survival after 4 years in experimental plantings.

KORSTIAN, CLARENCE F. (See Baker, Korstian, and Fetherolf. 1921)

KORSTIAN, CLARENCE F., and N. J. FETHEROLF. 1921. Control of stem girdle of spruce transplants caused by excessive heat. Phytopathology 11: 485-490.

KORSTIAN, CLARENCE F. (See Supplement, p. 37: Toumey and Korstian. 1954)

LANDGRAF, A. E. 1959. Forest insect conditions in the central Rocky Mountains, 1958. U.S. Forest Serv., Rocky Mountain Forest and Range Expt. Sta. Paper 40, 19 pp.

LANDGRAF, A. E., and H. E. OSTMARK. 1958. Forest insect conditions in the central Rocky Mountains, 1957. U.S. Forest Serv., Rocky Mountain Forest and Range Expt. Sta. Paper 34, 20 pp.

LANGENHEIM, JEAN H. 1955. Flora of the Crested Butte Quadrangle, Colorado. Madroño 13: 64-78.

LANGENHEIM, JEAN H. 1962. Vegetation and environmental patterns in the Crested Butte area, Gunnison County, Colorado. Ecol. Monog. 32: 249-285.

Community description.

LANGILLE, H. D., FRED G. PLUMMER, ARTHUR DODWELL, THEODORE F. RIXON, and JOHN LEIBERG. 1903. Forest conditions in the Cascade Range Forest Reserve, Oregon. U.S. Dept. Int., Geol. Surv. Prof. Paper 9, 298 pp.

Discusses distribution of Engelmann spruce, community composition based on volume, and size-age relationships of this species.

LARSEN, J. A. 1918. Comparison of seed testing in sand and in the Jacobsen germinator. Jour. Forestry 16: 690-695.

Reports on the germination of Engelmann spruce.

LARSEN, J. A. 1924. Some factors affecting reproduction after logging in northern Idaho. Jour. Agr. Res. 28: 1149-1157.

Lists factors affecting establishment of Engelmann spruce, hemlock, and white pine.

LARSEN, J. A. 1925. Natural reproduction after forest fires in northern Idaho. Jour. Agr. Res. 30: 1177-1197.

Quantitative data on community composition based on density; also quantitative data on reproduction.

LARSEN, J. A. 1927. Relation of leaf structure of conifers to light and moisture. Ecology 8: 371-377.

Describes anatomy of Engelmann spruce leaves.

LARSEN, J. A. 1929. Fires and forest succession in the Bitterroot Mountains of northern Idaho. Ecology 10: 67-76.

Distribution and autecological information on Engelmann spruce.

LARSEN, J. A. 1930. Forest types of the northern Rocky Mountains and their climatic controls. Ecology 11: 631-672.

Includes climatic data and community description.

LARSEN, J. A. 1940. Site factor variations and responses in temporary forest types in northern Idaho. Ecol. Monog. 10: 1-54.

Discusses topographic distribution of Engelmann spruce.

LEAPHART, C. D. (See Gilbertson, Leaphart, and Johnson. 1961)

LeBARRON, RUSSELL K., and G. M. JEMISON. 1953. Ecology and silviculture of Engelmann spruce-alpine fir type. Jour. Forestry 51: 349-355.

Includes community description and autecology of Engelmann spruce.

LEE, MERLIN RAYMOND. 1960. Montane mammals of southeastern Utah--with emphasis on the effects of past climates upon occurrence and differentiation. Ph.D. thesis. Univ. Utah, Salt Lake City.

Discusses distribution of Engelmann spruce.

LEHRLE, L. W. W. (See Clark, Lehrle, and Smith. 1954)

LEIBERG, JOHN B. 1899. Priest River Forest Reserve. U.S. Geol. Surv. Ann. Rpt. 19, 1897-98, Part V-Forest reserves: 217-252.

Distribution and community.

LEIBERG, JOHN B. 1899. Bitterroot Forest Reserve. U.S. Geol. Surv. Ann. Rpt. 19, 1897-98, Part V-Forest reserves: 253-282.

Community description.

LEIBERG, JOHN B. 1899. Present condition of the forested areas in northern Idaho outside the limits of the Priest River Forest Reserve and north of the Clearwater River. U.S. Geol. Surv. Ann. Rpt. 19, 1897-98, Part V-Forest reserves: 373-386.

Distribution of Engelmann spruce.

LEIBERG, JOHN B. 1900. Bitterroot Forest Reserves. U.S. Geol. Surv. Ann. Rpt. 20, 1898-99, Part V-Forest reserves: 317-410.

LEIBERG, JOHN B. 1900. Cascade Range Forest Reserve, Oregon ... together with the Ashland Forest Reserve and adjacent forest regions ... . U.S. Geol. Surv. Ann. Rpt. 21, Part V-Forest reserves: 209-498.

Community and distribution.

LEIBERG, JOHN B. 1900. Sandpoint Quadrangle, Idaho. U.S. Geol. Surv. Ann. Rpt. 21, Part V-Forest reserves: 583-595.

Community composition.

LEIBERG, JOHN B. 1904. Forest conditions in the Absaroka Division of the Yellowstone Forest Reserve, Montana, and the Livingston and Big Timber Quadrangles. U.S. Dept. Int., Geol. Surv. Prof. Paper 29, 148 pp.

Describes community composition, and reproduction and size-age relationship of Engelmann spruce.

LEIBERG, JOHN B. 1904. (See Supplement, p. 37)

LEIBERG, JOHN B. (See Langille et al. 1903)

LEIBERG, JOHN B., THEODORE F. RIXON, and ARTHUR DODWELL. 1904. Forest conditions in the San Francisco Mountains Forest Reserve, Arizona. U.S. Dept. Int., Geol. Surv. Prof. Paper 22, 95 pp.

Discusses community composition based on volume (B.M.), and distribution and size of Engelmann spruce.

LEMMON, J. G. 1895. Handbook of west American cone-bearers. 104 pp. 3d ed. Oakland.

Reports on Picea engelmanni var. Franciscana Lemmon.

LEMMON, J. G. 1897. Three west-American conifers. Gard. and Forest 10: 183.

Picea columbiana nom. nov. is taken up for Picea engelmanni Engelm.

LENTZ, P. L. (See McKay and Lentz. 1960)

LEOPOLD, E. B. 1953. Timberline growth rate and climatic correlations on Pike's Peak, Colorado. Ecol. Soc. Amer. Bul. 34: 90.

LIST, PETER. 1959. Growth prediction in spruce-fir forest type on U. S. U. College forest. Master's thesis. Utah State Univ., Logan.

LITTLE, ELBERT L., JR. 1944. Notes on nomenclature in Pinaceae. Amer. Jour. Bot. 31: 587-596.

Discusses history and taxonomy of Engelmann spruce.

LITTLE, ELBERT L., JR. 1949. Important forest trees of the United States. IN: U.S. Dept. Agr., Trees, Yearbook of Agriculture, 1949: 763-814.

Discusses distribution and uses of Engelmann spruce.

LITTLE, ELBERT L., JR. 1950. Southwestern trees, a guide to the native species of New Mexico and Arizona. U.S. Dept. Agr., Agr. Handb. 9, 109 pp.

LITTLE, ELBERT L., JR. 1953. Check list of native and naturalized trees of the United States (including Alaska). U.S. Dept. Agr., Agr. Handb. 41, 472 pp.

LITTLE, ELBERT L., JR. 1953. A natural hybrid spruce in Alaska. Jour. Forestry 51: 745-746.

Intergrades between P. glauca and P. engelmanni are common in southern British Columbia.

LITTLE, ELBERT L., JR. 1956. Pinaceae of Nevada. Contributions toward a flora of Nevada 40: 1-40. U.S. Dept. Agr., Agr. Res. Serv., Plant Indus. Sta., Beltsville, Md.

Description of Engelmann spruce and its distribution in Nevada.

LIVINGSTON, B. E., and F. SHREVE. 1921. The distribution of vegetation in the United States, as related to climatic conditions. Carnegie Inst. Wash. Pub. 284, 590 pp.

Lists climatic data.

LOFGREN, B. G. 1952. A calendar of springtime for the Rocky Mountain region. Utah Acad. Sci., Arts and Letters Proc. 29:34-38.

Discusses phenology of blooming in Engelmann spruce in Utah.

LOHWAG, K. 1950. Bienenwabenfäule, hervorgeruten durch Phellinus nigrolimitatus (Romell) B. et G. Mitt. öst Ges. Holzforsch. 2(3):22-24.

Discusses honeycomb rot.

LONGYEAR, BURTON O. 1914. The evergreens of Colorado. 80 pp. Fort Collins, Colo.

LONGYEAR, BURTON O. 1926. The nature of decay in wood. Colo. Agr. Expt. Sta. Bul. 307, 58 pp.

LONGYEAR, BURTON O. 1927. Trees and shrubs of the Rocky Mountain region with keys and descriptions for their identification. 244 pp. New York: G. P. Putnam's Sons.

LOVE, L. D. 1955. The effect on streamflow of the killing of spruce and pine by the Engelmann spruce beetle. Amer. Geophys. Union Trans. 36(1): 113-118.

LOVE, L. D., and B. C. GOODELL. 1960. Watershed research on the Fraser Experimental Forest. Jour. Forestry 58: 272-275.

LOVERIDGE, E. W. 1924. Spruce barrens and sheep grazing. Jour. Forestry 22: 806-809.

Presents autecological information on Engelmann spruce.

LOWDERMILK, W. C. 1925. Factors affecting reproduction of Engelmann spruce. Jour. Agr. Res. 30: 995-1009.

LULL, HOWARD W., and LINCOLN ELLISON. 1950. Precipitation in relation to altitude in central Utah. Ecology 31: 479-484.

Gives climatic data.

LUTZ, H. J., and R. F. CHANDLER. 1947. Forest soils. 514 pp. New York: John Wiley.

Humus formation.

MALMSTER, HARRY E. (See Sampson and Malmster. 1926)

MARCH, R. E. (See Pearson and March. 1935)

MARCO, HERBERT F. 1931. Needle structure as an aid in distinguishing Colorado blue spruce from Engelmann spruce. Bot. Gaz. 92: 446-449.

MARCO, HERBERT F. 1939. The anatomy of spruce needles. Jour. Agr. Res. 58: 357-368.

MARKWARDT, L. J. 1930. Comparative strength properties of woods grown in the United States. U.S. Dept. Agr. Tech. Bul. 158, 38 pp.

MARR, JOHN W. 1958. Lee slope stands in the upper part of the forest-tundra ecotone on Niwot Ridge, Boulder County, Colorado. Jour. Colo.-Wyo. Acad. Sci. 4(10): 41. (Abstract.)

Includes community description and snow cover characteristics.

MARR, JOHN W. 1959. Forms of tree islands in alpine tundra. Jour. Colo.-Wyo. Acad. Sci. 4(11): 34. (Abstract.)

Hypothesis attempting to explain the development, maintenance, and modification of tree species in "tree islands" in alpine tundra.

MARR, JOHN W. 1961. Ecosystems of the east slope of the Front Range in Colorado. Univ. Colo. Studies, Biol. Ser. 8, 134 pp.

MASSEY, C. L. 1953. Engelmann spruce beetle. Amer. Forests 59: 31.

MASSEY, C. L. 1956. Nematode parasites and associates of the Engelmann spruce beetle (Dendroctonus engelmanni Hopk.). Helminthological Soc. Wash. 23: 14-24.

MASSEY, C. L., R. D. CHISHOLM, and N. D. WYGANT. 1953. Chemical control of the Engelmann spruce beetle in Colorado. Jour. Econ. Ent. 46: 951-955.

MASSEY, C. L., and N. D. WYGANT. 1954. Biology and control of the Engelmann spruce beetle in Colorado. U.S. Dept. Agr. Cir. 944, 35 pp.

MATHERS, W. G. 1932. Spruce budworm in British Columbia. Forestry Chron. 8: 154-157.

McCAMBRIDGE, W. F. (See Knight, McCambridge, and Wilford. 1956)

McCOMB, DAVID. 1953. The use of trap trees for the control of the Engelmann spruce beetle, Dendroctonus engelmanni Hopkins. Master's thesis. Utah State Univ., Logan.

McCOMB, DAVID. 1955. Relationship between trap tree felling dates and subsequent Engelmann spruce beetle attack. U.S. Forest Serv., Intermountain Forest and Range Expt. Sta. Res. Note 23, 5 pp.

Engelmann spruce trees felled in June as traps for Engelmann spruce beetles proved to be most effective.

McCOMB, DAVID. (See Nagel, McComb, and Knight. 1957)

McCULLOUGH, H. A. 1948. Plant succession of fallen logs in a virgin spruce-fir forest. Ecology 29: 508-513.

McCULLOUGH, H. A. 1950. Preliminary comparison of tree mycorrhizae on fallen logs and on the forest floor. Jour. Tenn. Acad. Sci. 25: 224.

McDOUGALL, W. B., and M. C. JACOBS. 1927. Tree mycorrhizas from the central Rocky Mountain region. Amer. Jour. Bot. 14: 258-266.

McGUFFIN, W. C. 1943. New descriptions of larvae of forest insects. VI. Semiothisa, Paraphia, Protoboarmia (Lepidoptera, Geometridae). Can. Ent. 75: 134-138.

Includes Semiothisa granitata Gn., Paraphia piniata Pack, and Protoboarmia porcelaria indicataria Wlk.

McGUFFIN, W. C. 1943. New descriptions of larvae of forest insects. VII. Pero, Nepytia, Caripeta (Lepidoptera, Geometridae). Can. Ent. 75: 186-190.

Includes Nepytia canosaria and Caripeta divisata.

McKAY, H. H., and P. L. LENTZ. 1960. Descriptions of some fungi associated with forest tree decay in Colorado. Mycopathologia et Mycologia Applicata, Den Haag 13: 265-285.

McKEEVER, D. G. 1942. Results of direct seeding of western redcedar and Engelmann spruce in the northern Rocky Mountain region. U.S. Forest Serv., North. Rocky Mountain Forest and Range Expt. Sta. Res. Note 21, 9 pp.

McKINNON, F. S. 1940. Spruce regeneration in British Columbia. Forestry Chron. 16: 37-45.

McMILLAN, CALVIN. 1948. A taxonomic and ecological study of the flora of the Deep Creek Mountains of central western Utah. Master's thesis. Univ. Utah, Salt Lake City.

Community description.

McQUILKIN, W. E. 1949. Direct seeding of trees. IN: U.S. Dept. Agr., Trees, Yearbook of Agriculture, 1949: 136-146.

Discusses advantages, disadvantages, principles, and methods of direct seeding.

MEEKER, VICTOR K. 1949. Reproduction of Engelmann spruce in the central Rocky Mountains. Master's thesis. Colo. State Univ., Fort Collins.

MEEUWIG, RICHARD O. 1960. Watersheds A and B. A study of surface runoff and erosion in the subalpine zone of central Utah. Jour. Forestry 58: 556-560.

Gives climatic data.

MERKLE, JOHN. 1954. An analysis of a spruce-fir community on the Kaibab Plateau, Arizona. Ecology 35: 316-322.

Includes community description and distribution, and climatic and edaphic data.

MERRIAM, C. HART. 1890. Results of a biological survey of the San Francisco mountain region of the Little Colorado in Arizona. North Amer. Fauna 3: 1-134.

Discusses distribution of Engelmann spruce and lists associated species.

MERRILL, T. C. (See Hartley, Merrill, and Rhoads. 1918)

METCALF, M. E. 1951. Lumber production approaches all-time record for northern

Rocky Mountain region. U.S. Forest Serv., North. Rocky Mountain Forest and Range Expt. Sta. Res. Note 103, 4 pp. (Rev. 1952.)

METCALF, M. E. (See Finch, Hodge, and Metcalf. 1950)

MICHAUX, F. ANDREW, and THOMAS NUTTALL. 1854. The North American sylva; or a description of the forest trees of the United States, Canada, and Nova Scotia. 6 vols. Philadelphia.

MIELKE, JAMES L. 1950. Rate of deterioration of beetle-killed Engelmann spruce. Jour. Forestry 48: 882-888.

MIELKE, JAMES L., and ROSS W. DAVIDSON. 1947. Notes on some western wood-decay fungi. Plant Dis. Rptr. 31: 27-30.

Lists several species of fungi on Engelmann spruce.

MILLER, ROBERT L. 1959. Lumber production in Colorado, 1957. U.S. Forest Serv., Rocky Mountain Forest and Range Expt. Sta. Forest Surv. Release 1, 9 pp.

MILLER, ROBERT L., and ALVIN K. WILSON. 1959. Lumber production in Wyoming, 1957. U.S. Forest Serv., Rocky Mountain Forest and Range Expt. Sta. Forest Surv. Release 2, 9 pp.

MILLS, A. R., and T. E. TIMELL. 1963. Constitution of three hemicelluloses from the wood of Engelmann spruce (Picea engelmanni). Can. Jour. Chem. 41: 1389-1395.

MILLS, H. B. 1942. Montana insect pests, 1941 and 1942. Mont. Agr. Expt. Sta. Bul. 408, 36 pp.

Describes damage by Harmologa fumiferana to Engelmann spruce.

MOGREN, E. W. 1958. Local cord-volume table for beetle-killed Engelmann spruce on the Routt National Forest, Colorado. Colo. Col. Forestry and Range Mangt. Res. Note 8, 3 pp.

MORE, ROBERT E. 1949. Colorado evergreens. Rev. ed. 89 pp. Denver Mus. Nat. Hist.

MORTON, B. R. 1917. Native trees of Canada. Canada Dept. Int., Forestry Branch, Bul. 61, 233 pp.

Includes description and information on distribution.

MOSS, ALAN. 1960. Spruce silvicultural management for the future. Forestry Chron. 36: 156-162.

MOSS, E. H. 1955. The vegetation of Alberta. Bot. Rev. 23: 493-567.

A comprehensive review.

MOSS, E. H., and GEORGE PEGG. 1963. Noteworthy plant species and communities in west-central Alberta. Can. Jour. Bot. 41: 1079-1105.

Note on Engelmann spruce.

MUELLER, LINCOLN A. 1959. Beetle-killed Engelmann spruce shows promise as a raw material for particle board. U.S. Forest Serv., Rocky Mountain Forest and Range Expt. Sta. Res. Note 35, 6 pp.

MUELLER, LINCOLN A., and ROLAND L. BARGER. 1963. Lumber grade recovery from Engelmann spruce in Colorado. U.S. Forest Serv. Res. Paper RM-1, 23 pp. Rocky Mountain Forest and Range Expt. Sta.

MULHOLLAND, F. D. 1937. The forest resources of British Columbia. Dept. Lands and Forests, Brit. Columbia Forest Serv., 153 pp.

MUNNS, E. N. 1938. The distribution of important forest trees of the United States. U.S. Dept. Agr. Misc. Pub. 287, 176 pp.

MURI, GLEN. 1955. The effects of simulated slash burning on germination, top-root ratio, and survival of Engelmann spruce and alpine fir. Univ. Brit. Columbia Forest Club Res. Note 14, 7 pp.

NAGEL, R. H., D. McCOMB, and F. B. KNIGHT. 1957. Trap tree method for controlling the Engelmann spruce beetle in Colorado. Jour. Forestry 55: 894-898.

NELSON, ARTHUR L. 1950. Beetles kill four billion board feet of Engelmann spruce in Colorado. Jour. Forestry 48: 182-183.

NELSON, ARTHUR L. 1954. Control and salvage policy: Spruce beetle control in Colorado. Jour. Forestry 52: 503-505.

Describes methods of salvaging timber.

NELSON, ARTHUR L. (See Wygant and Nelson. 1949)

NICHOL, A. A. 1952. The natural vegetation of Arizona. Ariz. Agr. Expt. Sta. Tech. Bul. 127. (Revision of Tech. Bul. 68, 1943.) Tucson: Univ. Ariz.

Discusses distribution of Engelmann spruce.

NOTESTEIN, N. B. (See Bates, Notestein, and Keplinger. 1914)

NUTTALL, THOMAS. (See Michaux and Nuttall. 1854)

OLSON, D. S. 1930. Growing trees for forest planting in Montana and Idaho. U.S. Dept. Agr. Cir. 120, 91 pp.

OLSON, D. S. 1932. Germinative capacity of seed produced from young trees. Jour. Forestry 30: 871.

Discusses Engelmann spruce which bear cones at 16 years.

OLSON, D. S. 1959. Identification of coniferous seedlings in the northern Rocky Mountains. Univ. Idaho Forest, Wildlife, and Range Expt. Sta. Res. Note 15, 2 pp.

OLSON, D. S., and GEORGE R. FAHNESTOCK. 1955. Logging slash: A study of the problem in Inland Empire Forests. Univ. Idaho Forest, Wildlife, and Range Expt. Sta. Bul. 1, 52 pp.

OOSTING, HENRY J., and JOHN F. REED. 1952. Virgin spruce-fir of the Medicine Bow Mountains, Wyoming. Ecol. Monog. 22: 66-70.

Gives quantitative phytosociological data.

OSTMARK, H. EUGENE. 1957. Forest insect conditions in the central Rocky Mountains, 1956. U.S. Forest Serv., Rocky Mountain Forest and Range Expt. Sta. Paper 27, 14 pp.

OSTMARK, H. EUGENE. 1957. The life history of Coeloides dendroctoni Cush., a braconid parasite of the Engelmann spruce beetle. Jour. Colo.-Wyo. Acad. Sci. 4: 48.

OSTMARK, H. EUGENE, and B. H. WILFORD. 1956. Forest insect conditions in the central Rocky Mountains, 1955. U.S. Forest Serv., Rocky Mountain Forest and Range Expt. Sta. Paper 22, 13 pp.

OSTMARK, H. EUGENE. (See Landgraf and Ostmark. 1958)

OVERHOLTS, L. O. 1919. Some Colorado fungi. Mycologia 11: 245-258.

Lists fungi species of conifer forests dominated by Engelmann spruce.

OVERHOLTS, L. O. 1930. Mycological notes for 1928-1929. Mycologia 22: 232-246.

Describes Phlebia mellea on dead Engelmann spruce in Colorado.

PADDOCK, MARK W. 1953. Comparison of wind in four climax areas in Boulder County, Colorado. Jour. Colo.-Wyo. Acad. Sci. 4(5): 40-41. (Abstract.)

PADDOCK, MARK W. 1960. Some characteristics of air temperature in four adjacent climax regions of the Colorado Front Range. Jour. Colo.-Wyo. Acad. Sci. 5(1): 31. (Abstract.)

PADY, S. M. 1940. Preliminary observations on the aecial hosts of Melampsorella. Kansas Acad. Sci. Trans. 43: 147-151.

PADY, S. M. 1941. Further notes on the witches' brooms and the substomatal pycnia of Melampsorella. Kansas Acad. Sci. Trans. 44: 190-201.

PADY, S. M. 1942. Distribution patterns in Melampsorella in the national forests and parks of the western states. Mycologia 34: 606-627.

PARKER, JOHNSON. 1951. Moisture retention in leaves of conifers of the northern Rocky Mountains. Bot. Gaz. 113: 210-216.

PARKER, JOHNSON. 1952. Environment and forest distribution in the Palouse Range in northern Idaho. Ecology 33: 451-461.

PATERSON, D. N. 1958. Some observations of the virgin spruce-balsam forest in the British Columbia interior, with thoughts on reforestation in Great Britain. Emp. Forest Rev. 37: 399-407.

Discusses ecology of forests.

PATTEN, D. T. 1963. Vegetational pattern in relation to environments in the Madison Range, Montana. Ecol. Monog. 33: 375-406.

PATTEN, D. T. 1963. (See Supplement, p. 37)

Includes quantitative phytosociological data, environmental data, and vegetational change.

PAUL, B. H. 1961. Choose the right wood. Properties and uses of some minor western softwoods. Woodwkg. Dig. 63(10): 26-27.

PAUL, B. H. (See Drow, Paul, and Dohr. 1955)

PEARCE, W. J. 1939. Growth in cutover stands in the Engelmann spruce type. Jour. Forestry 37: 977.

PEARSON, G. A. 1913. What is the proper basis for the classification of forest land into types? Soc. Amer. Foresters Proc. 8: 79-84.

Distribution of Engelmann spruce.

PEARSON, G. A. 1920. Factors controlling the distribution of forest types, Part I. Ecology 1: 139-154.

Climatic, edaphic, and topographic factors.

PEARSON, G. A. 1920. Factors controlling the distribution of forest types, Part II. Ecology 1: 289-308.

Includes climatic data and autecology of Engelmann spruce.

PEARSON, G. A. 1924. Studies in transpiration of coniferous tree seedlings. Ecology 5: 340-347.

PEARSON, G. A. 1928. Measurement of physical factors in silviculture. Ecology 9: 404-411.

Discusses temperature data and reproduction of Engelmann spruce.

PEARSON, G. A. 1931. Forest types in the southwest as determined by climate and soil. U.S. Dept. Agr. Tech. Bul. 247, 144 pp.

PEARSON, G. A., and R. E. MARCH. 1935. Timber growing and logging practice in the southwest and in the Black Hills region. U.S. Dept. Agr. Tech. Bul. 480, 80 pp.

PEATTIE, D. C. 1953. A natural history of western trees. Boston: Houghton-Mifflin Co.

Includes general information on Engelmann spruce.

PEFFER, E. F. (See Pissot and Peffer. 1948)

PEGG, GEORGE. (See Moss and Pegg. 1963)

PENHALLOW, D. P. 1904. The anatomy of the North American coniferales together with certain exotic species from Japan and Australia. Amer. Nat. 38: 243-273, 331-359, 523-554, 691-723.

Characteristics of wood anatomy of Engelmann spruce are given in a table on page 714.

PENHALLOW, D. P. 1907. A manual of the North American gymnosperms. 374 pp. Boston: Ginn and Company.

Discusses wood anatomy and distribution of Engelmann spruce.

PETERSON, G. 1961. Board-foot volumes of Engelmann spruce to an 8-inch top. U.S. Forest Serv., Rocky Mountain Forest and Range Expt. Sta. Res. Note 56, 2 pp.

Arizona and New Mexico.

PETERSON, ROGER S. 1961. Notes on western rust fungi. I. Chrysomyxa. Mycologia 53: 427-431.

Discusses Chrysomyxa arctostaphyli Diet. on Engelmann spruce.

PETERSON, ROGER S. 1963. Effects of broom rusts on spruce and fir. U.S. Forest Serv., Res. Paper INT-7, 10 pp.

PFLUGBEIL, ERNST. 1960. Proposed site indices for Engelmann spruce on the College Forest of the U. S. U., Logan. Master's thesis. Utah State Univ., Logan.

PIERCE, D. A. (See Yasinski and Pierce. 1958)

PIERCE, ROY G. (See Hartley and Pierce, 1917; and Hartley, Pierce, and Hahn, 1919)

PIERSON, R. K., and JOHN EHRLICH. 1937. Effects of the autumn 1935 cold wave on forest trees in northern Idaho. Plant Dis. Rptr. 21: 64-65.

Engelmann spruce suffered considerable browning and premature needle cast.

PISSOT, HENRY J., and E. F. PEFFER. 1948. Forest resource statistics Cascade County, Montana. U.S. Forest Serv., North. Rocky Mountain Forest and Range Expt. Sta. Paper 12, 22 pp.

PLUMMER, FRED G. 1900. Mount Rainier Forest Reserve, Washington. U.S. Geol.

Surv. Ann. Rpt. 21, Part V-Forest reserves: 81-143.

Community and distribution information.

PLUMMER, FRED G. 1902. Forest conditions in the Cascade Range, Washington. U.S. Dept. Int., Geol. Surv. Prof. Paper 6, 42 pp.

Includes distributional map of Engelmann spruce and discusses community composition based on volume (B.M.).

PLUMMER, F. G. (From notes by Theodore F. Rixon and Arthur Dodwell.) 1904. Forest conditions in the Black Mesa Forest Reserve, Arizona. U.S. Dept. Int., Geol. Surv. Prof. Paper 23, 62 pp.

Discusses community composition based on volume (B.M.); also growth rate of Engelmann spruce (size-age).

PLUMMER, FRED G. (See Langille et al. 1903)

PLUMMER, FRED G., and M. G. GOWSELL. 1904. Forest conditions in the Lincoln Forest Reserve, New Mexico. U.S. Dept. Int., Geol. Surv. Prof. Paper 33, 47 pp.

Discusses quantitative community composition based on volume and density.

PREECE, SHERMAN J., JR. 1950. Floristic and ecological features of the Raft River Mountains of northwestern Utah. Master's thesis. Univ. Utah, Salt Lake City.

PRESTON, RICHARD J., JR. 1947. Rocky Mountain trees. 2d ed. 285 pp. Ames, Iowa: The Iowa State College Press.

Includes description of Engelmann spruce and general information on Engelmann spruce.

PRESTON, RICHARD J., JR. 1961. North American Trees. 2d ed. 395 pp. Ames, Iowa: The Iowa State College Press.

Includes description of Engelmann spruce and general information on the species.

PRICE, RAYMOND, and R. B. EVANS. 1937. Climate of the west front of the Wasatch Plateau in central Utah. U.S. Monthly Weather Rev. 65: 291-301.

PRICE, RAYMOND. (See Costello and Price. 1939)

RAGNARSSON, H. (See Bjarnason and Ragnarsson. 1958)

RALL, GLORIA, and W. G. SOLHEIM. 1961. Melampsoraceae of the Rocky Mountains. Colo.-Wyo. Acad. Sci. 5(2): 45.

Discusses Chrysomyxa pirolata Wint. and C. weirii Jacks. on Engelmann spruce.

RAMALEY, FRANCIS. 1907. Plant zones in the Rocky Mountains of Colorado. Science (N.S.) 26: 642-643.

RAMALEY, FRANCIS. 1907. The silva of Colorado. I. Trees of the pine family in Colorado. Univ. Colo. Studies 4: 109-122.

RAMALEY, FRANCIS. 1907. The silva of Colorado. III. Woody plants of Boulder County. Univ. Colo. Studies 5: 47-63.

RAMALEY, FRANCIS. 1909. The silva of Colorado. IV. Forest formations and forest trees. Univ. Colo. Studies 6: 249-281.

RAMALEY, FRANCIS. 1920. Subalpine lakeshore vegetation in north-central Colorado. Amer. Jour. Bot. 7: 57-74.

Zonation and succession.

RASMUSSEN, D. IRVIN. 1941. Biotic communities of the Kaibab Plateau, Arizona. Ecol. Monog. 11: 229-275.

RATHBUN, ANNIE E. 1923. Damping-off of taproots of conifers. Phytopathology 13: 385-391.

RATHBUN-GRAVATT, ANNIE. 1925. Direct inoculation of coniferous stems with damping-off fungi. Jour. Agr. Res. 30: 327-339.

RATHBUN-GRAVATT, ANNIE. 1931. Germination loss of coniferous seeds due to parasites. Jour. Agr. Res. 42: 71-92.

RAUP, HUGH M. 1934. Phytogeographic studies in the Peace and Upper Liard River Regions, Canada. 230 pp. Contrib. Arnold Arboretum 6.

Status of Engelmann spruce in these regions is considered.

REED, JOHN F. 1951. Probable successional relationships of the plant communities of the Jackson Hole Wildlife Park, Teton County, Wyoming. Jour. Colo.-Wyo. Acad. Sci. 4(3): 61. (Abstract.)

Engelmann spruce forest is considered to be terminal on north-facing slopes underlain by coarse glacial till.

REED, JOHN F. 1952. The vegetation of the Jackson Hole Wildlife Park, Teton County, Wyo. Amer. Midland Nat. 48: 700-729.

Community composition.

REED, JOHN F., and G. F. FREYTAG. 1949. The resin sac pattern in the needles of Engelmann spruce and blue spruce from southeastern Wyoming. Amer. Midland Nat. 41: 233-236.

REED, JOHN F. (See Freytag and Reed, 1948; and Oosting and Reed, 1952)

RHOADS, A. S. (See Hartley, Merrill, and Rhoads. 1918)

RHOADS, ARTHUR S., GEORGE G. HEDCOCK, ELLSWORTH BETHEL, and CARL HARTLEY. 1918. Host relationships of the North American rusts, other than Gymnosporangium, which attack conifers. Phytopathology 8: 309-352.

Discusses Chrysomyxa weirii on Engelmann spruce.

RICKARD, W. H. 1960. The distribution of small mammals in relation to the climax vegetation mosaic in eastern Washington and northern Idaho. Ecology 41: 99-106.

Community description.

RIORDAN, L. E. (See Yeager and Riordan. 1953)

RIXON, THEODORE F. 1905. Forest conditions in the Gila River Forest Reserve, New Mexico. U.S. Dept. Int., Geol. Surv. Prof. Paper 39, 89 pp.

Discusses community composition and growth rate of Engelmann spruce.

RIXON, THEODORE F. (See Langille et al., 1903; Leiberg, Rixon, and Dodwell, 1904; and Plummer, 1904)

ROACH, ARCHIBALD W. 1952. Phytosociology of the Nash Crater lava flows, Linn County, Oregon. Ecol. Monog. 22: 169-193.

Discusses quantitative community composition; Engelmann spruce is a minor species.

ROBBINS, W. W. 1910. Climatology and vegetation in Colorado. Bot. Gaz. 49: 256-280.

ROBBINS, W. W. 1918. Successions of vegetation in Boulder Park, Colorado. Bot. Gaz. 65: 493-525.

ROBINSON, E. W. (See DeGrace, Robinson, and Smith. 1952)

ROCHESTER, G. H. 1933. The mechanical properties of Canadian woods together with their related physical properties. Canada Dept. Int., Forest Serv. Bul. 82, 88 pp.

ROCKWELL, F. H. 1913. Basis of classification into forest types and its application to District 1. Soc. Amer. Foresters Proc. 8: 85-90.

Community description.

ROE, ARTHUR L., and CORLAND L. JAMES. 1959. Management problems in the Engelmann spruce-subalpine fir forest. Soc. Amer. Foresters Proc. 1958: 68-71.

ROESER, JACOB, JR. 1924. A study of Douglas fir reproduction under various cutting methods. Jour. Agr. Res. 28: 1233-1242.

ROESER, JACOB, JR. 1932. Transpiration capacity of coniferous seedlings and the problem of heat injury. Jour. Forestry 30: 381-395.

Describes resistance of Engelmann spruce seedlings to excessive heat and to transpiration.

ROESER, JACOB, JR. 1934. Growth in the Engelmann spruce type in central Colorado on good sites on granitic formations. Jour. Colo.-Wyo. Acad. Sci. 1(6): 46. (Abstract.)

Describes growth rate following light cutting.

ROESER, JACOB, JR. 1940. The water requirement of Rocky Mountain conifers. Jour. Forestry 38: 24-26.

Discusses seedling survival and growth for 5 years.

ROESER, JACOB, JR. (See Bates and Roeser, 1924; 1928)

RONCO, FRANK. 1961. Bibliography of Engelmann spruce and subalpine fir. U.S. Forest Serv., Rocky Mountain Forest and Range Expt. Sta. Paper 57, 58 pp.

Includes 512 references and a subject index.

RONCO, FRANK. 1961. Planting in beetle-killed spruce stands. U.S. Forest Serv., Rocky Mountain Forest and Range Expt. Sta. Res. Note 60, 6 pp.

ROTHERT, E. E. 1934. Density of stand in different forest types in Estes and Rocky Mountain National Parks. Jour. Colo.-Wyo. Acad. Sci. 1(6): 46. (Abstract.)

Discusses reproduction of Engelmann spruce and subalpine fir.

ROWAN, SAMUEL J. 1960. The susceptibility of twenty-three tree species to black root rot. Plant Dis. Rptr. 44: 646-647.

ROWE, J. S. 1959. Forest regions of Canada. Canada Dept. North. Affairs and Natl. Resources, Forestry Branch Bul. 123, 71 pp. (Revision of Bul. 89, "A forest classification for Canada," by W. E. D. Halliday, 1937.)

Includes distribution of Engelmann spruce and community classification.

RUDOLF, P. O. 1952. Low temperature seed storage for western conifers. U.S. Forest Serv., Lake States Forest Expt. Sta. Misc. Rpt. 20, 8 pp.

RYDBERG, P. A. 1915. Phytogeographical notes on the Rocky Mountain region IV. Forests of the subalpine and montane zones. Torrey Bot. Club Bul. 42: 11-25.

RYDBERG, P. A. 1916. Phytogeographical notes on the Rocky Mountain region VI. Distribution of the subalpine plants. Torrey Bot. Club Bul. 43: 343-364.

RYDBERG, P. A. 1916. Vegetative life zones of the Rocky Mountain region. N. Y. Bot. Gard. Mem. 6: 477-499.

Community description.

RYDBERG, P. A. 1917. Phytogeographical notes on the Rocky Mountain region VII. Formations in the subalpine zone. Torrey Bot. Club Bul. 44: 431-454.

RYDBERG, P. A. 1919. Phytogeographical notes on the Rocky Mountain region VIII. Distribution of the montane plants. Torrey Bot. Club Bul. 46: 295-327.

RYDBERG, P. A. 1920. Phytogeographical notes on the Rocky Mountain region IX. Wooded formations of the montane zone of the southern Rockies. Torrey Bot. Club Bul. 47: 441-454.

RYDBERG, P. A. 1922. Flora of the Rocky Mountains and adjacent plains. 2d ed. 1143 pp. Pub. by author, New York.

SAEMUNDSEN, E. G. (See Bjarnason and Sæmundsen. 1949)

SAMPSON, ARTHUR W. 1918. Climate and plant growth in certain vegetative associations. U.S. Dept. Agr. Bul. 700, 72 pp.

SAMPSON, ARTHUR W. 1925. The foothill-montane-alpine flora and its environment. IN: Tidestrom, Ivar, Flora of Utah and Nevada. U.S. Nat. Herb. Contrib. 25: 24-31.

Includes climatic data and community description.

SAMPSON, ARTHUR W., and HARRY E. MALMSTER. 1926. Grazing periods and forage production on the National Forests. U.S. Dept. Agr. Dept. Bul. 1405, 54 pp.

Includes community description and phenological observations.

SANTAMOUR, F. S., JR. 1960. New chromosome counts in Pinus and Picea. Silvae Genetica 9: 87-88.

n = 12 for Engelmann spruce.

SARGENT, CHARLES SPRAGUE. 1884. Report on the forests of North America (exclusive of Mexico). 612 pp. U.S. Census, 10th. 1880. Vol. 9.

SARGENT, C. S. 1890. The silva of North America, vol. 12. New York: Houghton Mifflin Co.

SARGENT, C. S. 1922. Manual of the trees of North America (exclusive of Mexico). 2d ed. 910 pp. Boston and New York: Houghton Mifflin Co.

SAUL, WILLIAM EMMETT. 1955. A descriptive catalogue of the trees and larger woody shrubs of Utah based on the anatomy of the wood. Ph.D. thesis. Univ. Utah, Salt Lake City.

Discusses anatomy of Engelmann spruce.

SCHAEFFER, W. H. 1954. Harvesting technique for beetle-killed Engelmann spruce on the western slope of Colorado. Jour. Forestry 52: 860-862.

SCHEFFER, T. C., and G. G. HEDGCOCK. 1955. Injury to northwestern forest trees by sulfur dioxide from smelters. U.S. Dept. Agr. Tech. Bul. 1117, 49 pp.

SCHENK, J. A. (See Clark and Schenk. 1962)

SCHNEIDER, E. C. 1909. The distribution of woody plants in the Pike's Peak region. Colo. Col. Pub. 12: 137-170.

Discusses distribution of Engelmann spruce.

SCHOPMEYER, C. S., and A. E. HELMERS. 1947. Seeding as a means of reforestation in the northern Rocky Mountain region. U.S. Dept. Agr. Cir. 772, 31 pp.

SCHUBERT, G. H. 1954. Viability of various coniferous seeds after cold storage. Jour. Forestry 52: 446-447.

SEAVER, F. J., and P. F. SHOPE. 1930. Mycological foray through the mountains of Colorado, Wyoming, and South Dakota. Mycologia 22: 1-8.

Discusses fungi noted on dead Engelmann spruce.

SEAVER, F. J., and P. E. SHOPE. 1935. New or noteworthy Basidiomycetes from the central Rocky Mountain region. Mycologia 27: 642-651.

Describes several species found on dead Engelmann spruce.

SEAVER, F. J., and P. F. SHOPE. 1936. Some Rocky Mountain Basidiomycetes. Univ. Colo. Studies 23(3): 189-197.

Describes Basidiomycetes noted on dead Engelmann spruce.

SECOR, J. B. 1957. Soil characteristics in relation to certain forest types in the northern Rockies. Dissert. Abs. 17: 735-736.

Idaho.

SHAFER, JOHN ADOLPH. (See Britton and Shafer. 1908)

SHANTZ, H. L., and R. ZON. 1924. Natural vegetation. IN: U.S. Dept. Agr., Atlas of American Agriculture, Part I, Sec. E.

Discusses distribution of Engelmann spruce.

SHARP, S. S. 1915. Notes on the determination of Rocky Mountain conifers. Torreya 15: 1-8.

SHAW, CHARLES GARDNER. 1958. Host fungus index for the Pacific Northwest 1. Hosts. Washington Agr. Expt. Sta. Cir. 335, 127 pp.

Lists many fungus diseases of Engelmann spruce.

SHEARER, RAYMOND C. 1960. (See Supplement, p. 37)

SHELFORD, V. E. (Ed.) 1926. Naturalist's guide to the Americas. 761 pp. Baltimore: Williams and Wilkins Company.

Includes some ecological information on Engelmann spruce and on distribution of the species.

SHEPHERD, R. F. 1959. Phytosociological and environmental characteristics of outbreak and non-outbreak areas of the two-year cycle spruce budworm, Choristoneura fumiferana. Ecology 40: 608-620.

SHIRLING, A. E. 1946. The age of needle leaves. Kansas Acad. Sci. Trans. 49: 161-166.

SHOPE, PAUL F. 1940. Colorado rusts of woody plants. Univ. Colo. Studies, Ser. D, 1(2): 105-127.

Lists several species of rusts on Engelmann spruce.

SHOPE, PAUL F. 1943. Some ascomycetous foliage diseases of Colorado conifers. Univ. Colo. Studies, Ser. D, 2(1): 31-43.

Two diseases are listed for Engelmann spruce.

SHOPE, PAUL F. (See Seaver and Shope, 1930; 1935; and 1936)

SHREVE, F. (See Livingston and Shreve. 1921)

SHREVE, FORREST. 1942. The vegetation of Arizona. IN: Kearney, T. H., and Robert H. Peebles, Flowering plants and ferns of Arizona. U.S. Dept. Agr. Misc. Pub. 423, pp. 10-23.

Discusses distribution of Engelmann spruce.

SIMON, C. L. 1961. Effects of lifting date, cold storage, and grading on survival of some coniferous nursery stock. Jour. Forestry 59: 449-450.

SLUSS, ROBERT REGINALD. 1955. A taxonomy of mites found associated with the Engelmann spruce beetle in the Uncompahgre National Forest. Master's thesis. Colo. State Univ., Fort Collins.

SMITH, A. D. (See Stoddard and Smith. 1955)

SMITH, GLENN WILLIAM. 1953. The biology and control of primary bark beetles (Dendroctonus) on the Ashley and Wasatch National Forests. Master's thesis. Univ. Utah, Salt Lake City.

SMITH, J. H. C. (See Goldsmith and Smith. 1926)

SMITH, J. HARRY G. 1950. Silviculture and management of Engelmann spruce in British Columbia, Picea engelmanni (Parry) Englm. Master's thesis. Yale Univ., New Haven, Conn.

SMITH, J. HARRY G. 1954. A cooperative study of Engelmann spruce-alpine fir. Silviculture and management. Northwest Sci. 28: 157-165.

SMITH, JOHN HARRY GILBERT. 1955. Some factors affecting reproduction of Engelmann spruce Picea engelmanni Parry and alpine fir Abies lasiocarpa (Hook.) Nutt. Ph.D. thesis. Yale Univ., New Haven, Conn.

Requirements for reproduction and factors altered by logging in British Columbia; includes a review of literature.

SMITH, J. HARRY G. 1956. Some factors affecting reproduction of Engelmann spruce and alpine fir. Brit. Columbia Dept. Lands and Forests, Forest Serv. Tech. Pub. T. 43, 43 pp.

SMITH, J. H. G. (See DeGrace, Robinson, and Smith, 1952; and Clark, Lehrle, and Smith, 1954)

SMITH, J. H. G., and M. B. CLARK. 1960. Growth and survival of Engelmann spruce and alpine fir on seed spots at Bolean Lake, B.C., 1954-59. Forestry Chron. 36: 46-49, 51.

SOCIETY OF AMERICAN FORESTERS. 1948. Forest practices for the inland empire. Jour. Forestry 46: 550-557.

Lists recommended cutting practices in spruce-fir type; gives community classification.

SOLHEIM, W. G. (See Rall and Solheim. 1961)

SOMERS, J. L. 1951. Some properties of the soil of spruce-fir forests in the Snowy Range, Wyoming. Master's thesis. Univ. Wyo., Laramie.

SPADA, B. 1960. Estimating past diameters of several species in the ponderosa pine subregion of Oregon and Washington. U.S. Forest Serv., Pacific Northwest Forest and Range Expt. Sta. Res. Note 181, 4 pp.

Discusses diameters based on relationship between bark thickness and d.o.b. at breast height.

SPAULDING, PERLEY. 1914. The damping-off of coniferous seedlings. Phytopathology 4: 73-87.

Pythium debaryanum caused damping-off in Engelmann spruce seedlings.

SPECTOR, WILLIAM S. (Ed.) 1956. Handbook of biological data. 584 pp. Philadelphia and London: W. B. Saunders Co. (Pages 137, 139, 141, 144, 147, 185, 336, 338, 452, 505.)

Provides valuable data on reproduction, phenology, morphology, physiology, and fungal parasites of Engelmann spruce.

SPENCER, JOHN W. 1915. Management of Engelmann spruce-alpine fir stands. Soc. Amer. Foresters Proc. 10: 192-198.

SPERRY, OMER E. 1936. A study of growth, transpiration and distribution of the conifers of the Rocky Mountain National Park. Torrey Bot. Club Bul. 63: 75-103.

SQUILLACE, A. E. 1954. Engelmann spruce seed dispersal into a clearcut area. U.S. Forest Serv., Intermountain Forest and Range Expt. Sta. Res. Note 11, 4 pp.

STAHELIN, R. 1941. Thirty-five years of planting on the national forests of Colorado. U.S. Forest Serv., Rocky Mountain Forest and Range Expt. Sta., 82 pp.

STAHELIN, R. 1943. Factors influencing the natural restocking of high altitude burns by coniferous trees in central Rocky Mountains. Ecology 24: 19-30.

STANTON, W. D. 1931. A preliminary study of the flora of the Henry Mountains of Utah. Master's thesis. Brigham Young Univ., Provo, Utah.

STARKER, T. J. 1934. Fire resistance in the forest. Jour. Forestry 32: 462-467.

Describes relative resistance of Engelmann spruce to fire and morphological characteristics associated with fire damage.

STEFANSSON, V. 1951. Nokkrar staðreyndin um skógræktina. Ársr. Skógræktarf. Íslands 1950: 5-23.

Presents growth data on Engelmann spruce in Iceland.

STEVENS, CLARK L. (See Toomey and Stevens. 1928)

STEWART, BELLE KATHERINE. 1940. Plant ecology and paleo-ecology of the Creede Valley. Ph.D. thesis. Univ. Colo., Boulder.

STEWART, DOUGLAS N. 1948. Response of Colorado blue spruce and Engelmann cuttings to hormone solutions. Mont. Acad. Sci. Proc. 1947-48(7-8): 39.

STILLINGER, C. R. 1929. Dasyscypha fusco-sanguinea Rehm on western white pine, Pinus monticola Dougl. Phytopathology 19: 575-584.

Describes Dasyscypha arida on Engelmann spruce in Idaho.

STIRLAND, LaGRANDE. 1930. The spruce gall aphid Adelges cooleyi (Gill) in Utah. Master's thesis. Utah State Univ., Logan.

STODDART, L. A., and A. D. SMITH. 1955. IN: Range Management, 2d ed., 433 pp. The coniferous-forest region, pp. 76-87. New York: McGraw-Hill Book Co., Inc.

STOVER, ERNEST L. 1944. Varying structure of conifer leaves in different habitats. Bot. Gaz. 106: 12-25.

STRUIK, G. J. (See Bray and Struik. 1963)

STUDHALTER, R. A. (See Glock, Studhalter, and Agerter. 1960)

STURGIS, W. C. 1913. Herpotrichia and Neopeckia on conifers. Phytopathology 3: 152-158.

Describes Herpotrichia nigra infesting leaves and twigs of Engelmann spruce.

STUTZ, HOWARD C. 1951. An ecological study of a Sphagnum lake in the subalpine forest of the Uinta Mountains of Utah. Master's thesis. Brigham Young Univ., Provo, Utah.

Provides quantitative phytosociological data.

SUDWORTH, GEORGE B. 1897. Nomenclature of the arborescent flora of the United States. U.S. Dept. Agr., Div. Forestry Bul. 14, 419 pp.

SUDWORTH, GEORGE B. 1889. Forest flora of the Rocky Mountain region. U.S. Dept. Agr., Div. Forestry Bul. 2: 153-197.

SUDWORTH, GEORGE B. 1898. Check list of the forest trees of the U.S., their names and ranges. U.S. Dept. Agr. Bul. 17, 144 pp. (Revised 1927 as U.S. Dept. Agr. Misc. Cir. 92, 295 pp.)

SUDWORTH, GEORGE B. 1900. White River Plateau Timber Land Reserve. U.S. Geol. Surv. Ann. Rpt. 20, 1898-99, Part V-Forest reserves: 117-179.

SUDWORTH, GEORGE B. 1900. Battlement Mesa Forest Reserve. U.S. Geol. Surv. Ann. Rpt. 20, 1898-99, Part V-Forest reserves: 181-243.

SUDWORTH, GEORGE B. 1900. The forest nursery: Collection of tree seeds and propagation of seedlings. U.S. Dept. Agr., Div. Forestry Bul. 29, 64 pp.

SUDWORTH, GEORGE B. 1908. Forest trees of the Pacific slope. U.S. Dept. Agr., Forest Serv. 441 pp. Washington: Govt. Printing Office.

SUDWORTH, GEORGE B. 1916. The spruce and balsam fir trees of the Rocky Mountain region. U.S. Dept. Agr. Bul. 327, 43 pp.

SVIHLA, RUTH DOWELL. 1932. The ecological distribution of the mammals on the north slope of the Uinta Mountains. Ecol. Monog. 2: 47-81.

Community description.

SWAINE, J. M. 1918. Canadian bark-beetles, Part II. A preliminary classification, with an account of the habits and means of control. Canada Dept. Agr., Ent. Branch (Tech.) Bul. 14, 143 pp.

TACKLE, D. 1955. A preliminary stand classification for lodgepole pine in the Intermountain region. Jour. Forestry 53: 566-569.

Succession.

TANNER, VASCO M. 1940. A biotic study of the Kaiparowits region of Utah. Great Basin Nat. 1: 97-126.

Community description.

TANNER, VASCO M., and C. LYNN HAYWARD. 1934. A biological study of the LaSal Mountains, Utah. Report No. 1 (Ecology). Utah Acad. Sci., Arts and Letters Proc. 11: 209-235.

Community description.

TAYLOR, RAYMOND F., and E. M. HORNIBROOK. 1937. The forest resources of Colorado. U.S. Forest Serv., Rocky Mountain Forest and Range Expt. Sta. Prelim. Rpt. March 15, 1937, 14 pp.

TAYLOR, T. M. C. 1959. The taxonomic relationship between Picea glauca (Moench) Voss and P. engelmannii Parry. Madroño 15: 111-115.

Discusses change of status of Engelmann spruce: Picea glauca (Moench) Voss subsp. engelmannii (Parry) stat. nov.

TAYLOR, WALTER P. 1935. Ecology and life history of the porcupine (Erethizon epixanthum) as related to the forests of Arizona and the southwestern United States. Univ. Ariz. Biol. Sci. Bul. 3, 177 pp.

Discusses damage to Engelmann spruce.

TERRELL, T. T. 1954. Mortality of the Engelmann spruce beetle brood during the winter of 1953-1954. U.S. Forest Serv., Intermountain Forest and Range Expt. Sta. Res. Note 10, 9 pp.

All-time low temperatures in January 1954 produced unusually high mortality of spruce beetle broods.

TERRY, WILLIAM Z. 1940. Native trees of Utah and the uses made of them by early settlers. Utah Acad. Sci., Arts and Letters Proc. 17: 115-117.

THOMPSON, M. W., and W. B. GREELEY. 1929. Timber growing and cutting practice in the lodgepole pine region. U.S. Dept. Agr. Dept. Bul. 1499, 33 pp.

Gives brief notes on the Engelmann spruce type (50% or more Engelmann spruce), including some notes on reproduction.

THOMSON, M. G. 1951. Engelmann spruce beetle. Canada Dept. Agr., Sci. Serv., Forest Biol. Div., Bimo. Prog. Rpt. 7(1): 4.

THOMSON, M. G., and J. WALTERS. 1951. Engelmann spruce bark-beetle. Canada Dept. Agr., Sci. Serv., Forest Biol. Div., Bimo. Prog. Rpt. 7(5): 3.

TIDESTROM, I. 1925. Flora of Utah and Nevada. U.S. Nat. Herb. Contrib., vol. 25, 665 pp.

TILLOTSON, C. R. 1917. Reforestation on the national forest. U.S. Dept. Agr. Bul. 475, 63 pp.

TIMELL, T. E. 1961. Characterization of four celluloses from the bark of gymnosperms. Svensk Papp Tidn. 64: 685-688.

TIMELL, T. E. 1961. Isolation of galactoglucomannans from the wood of gymnosperms. Tappi 44: 88-96.

TIMELL, T. E. 1961. Isolation of polysaccharides from the bark of gymnosperms. Svensk Papp Tidn. 64: 651-661.

TIMELL, T. E. (See Mills and Timell. 1963)

TOUMEY, JAMES W. (See Supplement, p.37: Toumey and Korstian. 1954)

TOUMEY, JAMES W., and CLARK L. STEVENS. 1928. The testing of coniferous tree seeds at the School of Forestry, Yale University, 1906-1926. Yale Univ., School Forestry Bul. 21, 46 pp.

TOWN, F. E. 1899. Bighorn Forest Reserve. U.S. Geol. Surv. Ann. Rpt. 19, 1897-98, Part V-Forest reserves: 165-190.

Distribution of Engelmann spruce.

TRAPPE, JAMES M. 1961. Some probable mycorrhizal associations in the Pacific Northwest. III. Northwest Sci. 35: 91-94.

Amanita pantherina (D.C. ex Fries) Secr. associated with Engelmann spruce on the west slope of the Cascade Range in southern Washington; Russula delica Fries associated with Engelmann spruce in Oregon and Washington.

TRAPPE, JAMES M. (See Franklin and Trappe. 1963)

TROXELL, H. E. 1954. The use of Rocky Mountain species for pulping. Jour. Forestry 52: 583-586.

Discusses distribution of Engelmann spruce.

TWOMEY, ARTHUR C. 1942. The birds of the Uintah Basin, Utah. Carnegie Museum (Pittsburgh) Annals 28: 341-490.

Discusses distribution of Engelmann spruce and birds associated with this species.

U.S. AGRICULTURAL RESEARCH ADMINISTRATION. 1946. Report of the Chief of the Bureau of Entomology and Plant Quarantine, 63 pp.

Outbreak of Engelmann spruce beetle in Colorado.

U.S. DEPT. AGRICULTURE. 1960. Index of plant diseases in the United States. U.S. Dept. Agr., Agr. Res. Serv., Crops Res. Div., Agr. Handb. 165, 531 pp.

U.S. DEPT. AGRICULTURE. 1961. Seeds, The Yearbook of Agriculture, 1961: 556, 560.

Seed characteristics are reported.

U.S. FOREST SERVICE. No date. How to know the trees of the Intermountain region. 20 pp. U.S. Dept. Agr., Forest Service Region 4, Ogden, Utah.

Includes description and distribution of Engelmann spruce.

U.S. FOREST SERVICE. 1907. Engelmann spruce. Silvical Leaflet 3, 4 pp.

U.S. FOREST SERVICE. 1913. Mechanical properties of woods grown in the United States. U.S. Dept. Agr., Forest Serv. Cir. 213, 4 pp.

Covers tests made on small, clear, green specimens of 49 species including Engelmann spruce.

U.S. FOREST SERVICE. 1928. The National Forests of Colorado. U.S. Dept. Agr. Misc. Pub. 18, 38 pp.

U.S. FOREST SERVICE. 1930. Forest and range resources of Utah: their protection and use. U.S. Dept. Agr. Misc. Pub. 90, 101 pp.

Gives a general description of Engelmann spruce and discusses its distribution in Utah.

U.S. FOREST SERVICE. 1943. Silviculture of the spruce-fir type. Rocky Mountain Forest and Range Expt. Sta. Ann. Rpt. 1943: 37-43.

U.S. FOREST SERVICE. 1946. Studies in biology and control of Engelmann spruce bark beetle. Rocky Mountain Forest and Range Expt. Sta. Ann. Rpt.: 65-66.

U.S. FOREST SERVICE. 1948. Reproduction and stand-condition survey in beetle-killed Engelmann spruce stands. Rocky Mountain Forest and Range Expt. Sta. Ann. Rpt. 1948: 29-35.

U.S. FOREST SERVICE. 1948. Woody-plant seed manual. U.S. Dept. Agr. Misc. Pub. 654, 416 pp.

U.S. FOREST SERVICE. 1952. A guide for the selection of superior trees in the northern Rocky Mountains. U.S. Forest Serv., Forest Genetics Steering Committee, North. Rocky Mountain Forest and Range Expt. Sta. Misc. Pub. 6, 7 pp.

U.S. FOREST SERVICE. 1954. Seedbed preparation for natural regeneration of western larch. Intermountain Forest and Range Expt. Sta. Ann. Rpt.: 13-14.

Engelmann spruce is included.

U.S. FOREST SERVICE. 1956. Entomological phases of the 1955 Montana spruce budworm control project. Intermountain Forest and Range Expt. Sta. Misc. Pub. 9, 12 pp.

Reports all phases of control operations.

U.S. FOREST SERVICE. 1956. Pole blight of western white pine. Intermountain Forest and Range Expt. Sta. Ann. Rpt.: 23-25.

U.S. FOREST SERVICE. 1956. Shade is beneficial to Engelmann spruce initial seedling survival. Intermountain Forest and Range Expt. Sta. Ann. Rpt.: 6-7.

Reports results of special treatments studying effects of shade, watering, and weeding.

U.S. FOREST SERVICE. 1956. Spruce mealybug. Intermountain Forest and Range Expt. Sta. Ann. Rpt.: 35.

Infestation of Engelmann spruce by spruce mealybug (Puto sp.) in southern Utah.

U.S. FOREST SERVICE. 1957. Forest insect conditions in the intermountain and northern Rocky Mountain states. Intermountain Forest and Range Expt. Sta. Misc. Pub. 11, 6 pp.

Reports decline in 1956 of a major epidemic of Engelmann spruce beetle dating from 1952; also reports a serious outbreak in Wyoming.

U.S. FOREST SERVICE. 1957. Summary of Engelmann spruce seminar at Fraser Experimental Forest August 30-31, 1956. 17 pp. Rocky Mountain Forest and Range Expt. Sta.

U.S. FOREST SERVICE. 1957; 1958. Artificial regeneration tried in beetle-killed spruce stands. Rocky Mountain Forest and Range Expt. Sta. Ann. Rpt. 1957: 25-27; Ann. Rpt. 1958: 47-53.

U.S. FOREST SERVICE. 1958. Forest insect conditions in the intermountain and northern Rocky Mountain states during 1957. Intermountain Forest and Range Expt. Sta. Misc. Pub. 13, 11 pp.

U.S. FOREST SERVICE. 1959. Forest insect conditions in the intermountain and northern Rocky Mountain states during 1958. Intermountain Forest and Range Expt. Sta. Misc. Pub. 18, 12 pp.

U.S. FOREST SERVICE. 1959. Spruce mealybug. Intermountain Forest and Range Expt. Sta. Ann. Rpt.: 21-23.

Southern Utah.

U.S. FOREST SERVICE. 1960. Engelmann spruce beetle control by preventive measures. Rocky Mountain Forest and Range Expt. Sta. Ann. Rpt.: 8.

U.S. FOREST SERVICE. 1960. Engelmann spruce regeneration. Intermountain Forest and Range Expt. Sta. Ann. Rpt.: 5-6.

Reports results of studies of seedbed preparation.

U.S. FOREST SERVICE. 1960. Forest insect conditions in the intermountain and northern Rocky Mountain states during 1959. Intermountain Forest and Range Expt. Sta. Misc. Pub. 23, 12 pp.

U.S. FOREST SERVICE. 1960. New records for lodgepole pine dwarfmistletoe. Rocky Mountain Forest and Range Expt. Sta. Ann. Rpt.: 11.

Lodgepole pine dwarfmistletoe (Arceuthobium americanum) was found for the first time on Engelmann spruce.

U.S. FOREST SERVICE. 1961. Biological factors control local Engelmann spruce beetle outbreak. Rocky Mountain Forest and Range Expt. Sta. Ann. Rpt.: 16-17.

U.S. FOREST SERVICE. 1961. Woodpeckers aggregate in Engelmann spruce beetle outbreaks. Rocky Mountain Forest and Range Expt. Sta. Ann. Rpt.: 18-19.

U.S. FOREST SERVICE. 1962. Photosynthesis of spruce seedlings favored by partial shade. Rocky Mountain Forest and Range Expt. Sta. Ann. Rpt.: 26-27.

U.S. FOREST SERVICE. 1962. Windthrow losses increasing in beetle-killed Engelmann spruce. Rocky Mountain Forest and Range Expt. Sta. Ann. Rpt.: 48.

U.S. FOREST SERVICE and BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE. 1951. Engelmann spruce bark beetle control project Colorado 1951, 26 pp.

VAARTAJA, O. 1959. Evidence of photoperiodic ecotypes in trees. Ecol. Monog. 29: 91-111.

VALK, U. 1960. Eestisse introdutseeritud kuused. Eesti NSV Teaduste Akadeemia Toimetised, Tallinn (Bioloogiline Seeria), 1960(1): 60-65.

Lists spruces introduced into Estonia and gives English summary.

VAN DERSAL, WILLIAM R. 1938. Native woody plants of the United States, their erosion-control and wildlife values. U.S. Dept. Agr. Misc. Pub. 303, 362 pp.

VAUX, HENRY J. 1954. Some implications of the spruce beetle control and salvage pro-

grams in Colorado. Jour. Forestry 52: 506-510.

WAHLENBERG, W. G. 1924. Stimulating the growth of Engelmann spruce in the nursery. U.S. Forest Serv., North. Rocky Mountain Forest and Range Expt. Sta. Appl. Forestry Note 45, 3 pp.

WAHLENBERG, W. G. 1924. Reforestation by seed sowing in the northern Rocky Mountains. Jour. Agr. Res. 30: 637-641.

WAHLENBERG, W. G. 1929. Relation of quantity of seed sown and density of seedlings to the development and survival of forest planting stock. Jour. Agr. Res. 38: 219-227.

WAHLENBERG, W. G. 1930. Experiments in the use of fertilizers in growing forest planting material at the Savenac Nursery. U.S. Dept. Agr. Cir. 125, 37 pp.

Describes effect of heavy watering and fertilizers on the germination of Engelmann spruce seeds and the development of Engelmann spruce seedlings in nursery soils.

WAHLENBERG, W. G. 1930. Investigations in weed control by zinc sulphate and other chemicals at the Savenac Forest Nursery. U.S. Dept. Agr. Tech. Bul. 156, 35 pp.

Germination and survival of seedlings are reported following zinc sulphate treatment.

WAITE, ROBERT STARR. 1962. The geographical distribution and control of destructive bark beetles and defoliating insects in the coniferous forests of Utah. Master's thesis. Univ. Utah, Salt Lake City.

WALTERS, J. (See Thomson and Walters. 1951)

WATERMAN, W. G. 1925. Plant communities of Alpine Park. Bot. Gaz. 80: 188-202.

Includes community description and data on succession and topographic distribution.

WATSON, J. R. 1912. The plant geography of north central New Mexico. Bot. Gaz. 54: 194-217.

Discusses distribution of Engelmann spruce.

WEAVER, J. E., and F. E. CLEMENTS. 1938. IN: Plant Ecology, 2d ed., 601 pp. The subalpine forest, pp. 492-496. New York: McGraw Hill Book Co., Inc.

WEIDMANN, R. H. (See Supplement, p. 37: Haig, Davis, and Weidmann. 1941)

WEIR, JAMES R. 1915. A new leaf and twig disease of Picea engelmanni. Jour. Agr. Res. 4: 251-254.

Includes report on Herpotrichia quinqueseptata.

WEIR, JAMES R. 1915. New hosts for some forest tree fungi. Phytopathology 5: 71-72.

Herpotrichia nigra is abundant on Engelmann spruce in Idaho; Polyporus lucidus grows on roots of Engelmann spruce.

WEIR, JAMES R. 1917. Sparassis radicata, an undescribed fungus on the roots of conifers. Phytopathology 7: 166-177.

WEIR, JAMES R. 1918. New hosts for Razoumofskya laricis. Phytopathology 8: 62-63.

WEIR, JAMES R. 1918. Notes on the altitudinal range of forest fungi. Mycologia 10: 4-14.

Lists several fungi occurring on Engelmann spruce.

WEIR, JAMES R. 1921. Polyporus dryadeus (Pers.) Fr. on conifers in the Northwest. Phytopathology 11: 99.

Discusses heart rot on conifers.

WEIR, JAMES R., and ERNEST E. HUBERT. 1918. Forest disease surveys. U.S. Dept. Agr. Bul. 658, 23 pp.

Lists several diseases of Engelmann spruce.

WHITE, KEITH L. 1960. Differential range use by mule deer in the spruce-fir zone. Northwest Sci. 34: 118-126.

Western Montana.

WHITESIDE, J. M., and V. M. CAROLIN, JR. 1961. Spruce budworm in the western United States. U.S. Dept. Agr. Forest Pest Leaflet 53, 8 pp.

WHITFIELD, C. J. 1933. The vegetation of the Pike's Peak region. Ecol. Monog. 3: 75-105.

Community description.

WHITFORD, H. N., and ROLAND D. CRAIG. 1918. Forests of British Columbia. Canada Comm. Conserv., Com. on Forests, Ottawa, 409 pp.

General ecological information on Engelmann spruce.

WILFORD, B. H. (See Knight, McCambridge, and Wilford, 1956; and Ostmark and Wilford, 1956)

WILSON, A. K. 1958. Log production in Idaho and Montana, 1956. U.S. Forest Serv., Intermountain Forest and Range Expt. Sta. Res. Note 54, 7 pp.

Includes report on salvage of beetle-killed spruce in Montana and Idaho since 1952.

WILSON, A. K. 1958. Pulpwood production in Idaho and Montana, 1956. U.S. Forest Serv., Intermountain Forest and Range Expt. Sta. Res. Note 55, 3 pp.

Engelmann spruce was an important source of pulpwood production in Idaho but not in Montana.

WILSON, ALVIN K. (See Miller and Wilson. 1959)

WINTERS, WAYNE STREET. 1954. Reinventory of soil and plant characteristics of Miller Watershed. Master's thesis. Univ. Utah, Salt Lake City.

Includes quantitative phytosociological data.

WOOD, STEPHEN L. 1949. The Scolytidae of the Logan Canyon area in Utah and their host plants. Utah Acad. Sci., Arts and Letters Proc. 26: 127-128.

Lists 14 species that occur on Engelmann spruce.

WOOD, STEPHEN L. 1951. Two new species and new genus of Scolytidae (Coleoptera) from Utah. Jour. Kansas Ent. Soc. 24(1): 31-32.

Reports on Carphoborus engelmanni and Polygraphus convexifrons on Engelmann spruce.

WOODWARD, K. W. 1917. Tree growth and climate in the United States. Jour. Forestry 15: 521-531.

WRIGHT, JONATHAN W. 1955. Species crossability in spruce in relation to distribution and taxonomy. Forest Sci. 1: 319-349.

WYGANT, N. D. 1958. Engelmann spruce beetle control in Colorado. Tenth Internatl. Cong. Ent. Proc. 1956: 181-184.

WYGANT, N. D. 1959. Bark beetle control. Jour. Forestry 57: 274-277.

WYGANT, N. D., and ARTHUR L. NELSON. 1949. Four billion feet of beetle-killed spruce. IN: U.S. Dept. Agr., Trees, Yearbook of Agriculture, 1949: 417-422.

WYGANT, N. D. (See Massey, Chisholm, and Wygant, 1953; and Massey and Wygant, 1954)

YASINSKI, F. M., and D. A. PIERCE. 1958. Forest insect conditions in Arizona, New Mexico, and west Texas. U.S. Forest Serv., Rocky Mountain Forest and Range Expt. Sta. Paper 39, 13 pp.

YEAGER, L. E. 1955. Two woodpecker population studies in relation to environmental change. Condor 57: 148-153.

Reports on spruce-fir forests of Colorado.

YEAGER, L. E., and L. E. RIORDAN. 1953. Effects of beetle-killed timber on range and wildlife in Colorado. North Amer. Wildlife Conf. Trans., 1953: 596-616.

YOUNG, L. J. 1911. Reproduction of Engelmann spruce after fire. Amer. Forestry 17: 396-402.

YOUNG, R. T. 1907. The forest formations of Boulder County, Colorado. Bot. Gaz. 44: 321-352.

Community description.

ZON, RAPHAEL. 1907. Cutting timber on the National Forests and providing for a future supply. U.S. Dept. Agr. Yearbook: 277-288.

Careful protection from ground fire and light cuttings which do not disturb the forest conditions are recommended for Engelmann spruce.

ZON, R. (See Shantz and Zon. 1924)

SUPPLEMENT

DAY, R. J., and P. J. B. DUFFY. 1963. Regeneration after logging in the Crowsnest Forest. Canada Dept. Forestry, Res. Branch Pub. 1007, 32 pp.

HAIG, I. T., K. P. DAVIS, and R. H. WEIDMANN. 1941. Natural regeneration in the western pine type. U.S. Dept. Agr., Tech. Bul. 767, 99 pp.

Factors are discussed that affect natural regeneration of conifers including Engelmann spruce.

LEIBERG, JOHN B. 1904. Forest conditions in the Little Belt Mountains Forest Reserve, Montana, and the Little Belt Mountains Quadrangle. U.S. Dept. Int., Geol. Surv. Prof. Paper 30, 75 pp.

Describes community composition based on volume (B.M.), reproduction, and size-age relationship of Engelmann spruce.

PATTEN, D. T. 1963. Light and temperature influence on Engelmann spruce seed germination and subalpine forest advance. Ecology 44: 817-818.

SHEARER, RAYMOND C. 1960. First-year mortality of coniferous seedlings in the western larch-Douglas-fir type. Mont. Acad. Sci. Proc. 20: 18-19. (Abstract.)

TOUMEY, JAMES W., and CLARENCE F. KORSTIAN. 3d ed. 1954. Seeding and planting in the practice of forestry. 520 pp. New York: John Wiley and Sons, Inc.

FOREST SERVICE CREED

The Forest Service of the U. S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives — as directed by Congress — to provide increasingly greater service to a growing nation.

Headquarters for the Intermountain Forest and Range Experiment Station are in Ogden, Utah. Project headquarters are also at:

Boise, Idaho
Bozeman, Montana (in cooperation with Montana State University)
Logan, Utah (in cooperation with Utah State University)
Missoula, Montana (in cooperation with University of Montana)
Moscow, Idaho (in cooperation with the University of Idaho)
Provo, Utah (in cooperation with Brigham Young University)